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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Chemical Warfare Again

THE Berlin correspondent of *The Times* has succeeded in reviving the controversy about chemical warfare and the popular suspicion and fear that Germany is secretly preparing new terrors to be suddenly launched on mankind. Germany, for anything we know, may be quite capable of this, but when the case is examined it is found to rest simply on a new German publication, "The Chemical War," by Dr. R. Hanslian and F. Bergendorff (Berlin: Mittler and Sons), described as a complete manual of gas tactics in all its known forms, based on experience and practice in the late war and since. We are inclined to think that the importance of the book has been vastly exaggerated. There are British and American publications which, treated by a German writer in an equally suspicious spirit, might easily convince the Germans that we are contemplating some equally terrible offensive against them.

In THE CHEMICAL AGE of May 7, 1921, a remarkable article by Sir William Pope was published, in which a carefully reasoned case was presented for the recognition of chemical warfare as a section of our defensive or offensive organisation. Major Lefebure, again, a very keen student of the subject, dealt with the matter in his book "The Riddle of the Rhine." The United States case is presented very fully in a volume "Chemical Warfare," by Brigadier-General A. A. Fries, Chief of the U.S.A. Chemical Warfare Service, and Major Clarence J. West, of the National Research Council, with a foreword by Major-General W. L. Sibert, of the U.S.A. Army.

Such books as these can leave no doubt in the mind of any other nation that Great Britain and the United States are studying the whole question of chemical warfare very thoroughly. No nation, in fact, which did not adopt a strictly pacifist attitude, could ignore the subject. The fundamental argument for the establishment of a British dyestuffs industry was national safety—in other words the existence of chemical plant and processes which could easily in case of emergency be switched over from peace to war purposes.

The unpleasant fact that has to be recognised is that chemistry has been applied definitely to war purposes, that it has proved a most efficient destructive or disabling agent, and that, as the organisers of war will naturally employ the most efficient methods at their service, they will turn almost inevitably to chemical resources. All war is necessarily barbaric in spirit; the question whether chemical warfare is a little more or a little less barbaric is a mere detail. It is no more a degradation of science to discover a new toxic gas that it is to invent a new gun or a new explosive. It is all part of the same dreadful business, and the only ultimate method of stopping chemical or naval or military or aerial warfare is to stop war altogether, and that simply means disarmament.

When we come to the question of disarmament, the question at once arises how can secret arrangements for the sudden employment of gases be prevented? Treaties are not always to be trusted; the Germans who subscribed to the Hague Article of 1907, expressly forbidding the employment of poisons or poisonous weapons, cheerfully violated it when it suited their purpose. They or others might do the same again, and "surprise" has always a high military value. We have heard it suggested that chemical disarmament is easier to arrange than ordinary naval or military disarmament, for the reason that gas experiments must be conducted in the open and could, therefore, not be concealed from secret service agents of other nations. We are inclined to doubt this view. In any case we may quote, as against it, the view of Professor Smithells that the "thinking out, devising, and making ready plans for the waging and for the intensification of gas warfare" can all be done "without any chance of detection by any system of supervision." Holding these views, Professor Smithells sees a serious danger in half-measures of preparation. "So

long," he writes, "as we have an army,—that is, so long as by national assent we prepare in that way for the defence of our country—it would be not only in the highest degree illogical but in the highest degree dangerous, if the army did not put itself in a position to deal with the kind of warfare which, to the best of my judgment, the most competent military authorities of this and other countries believe to be the warfare of the future, if warfare at all continues." That is precisely the view we once heard General Fries express as to the United States attitude. It is the view which, until all war is abolished, one is irresistibly forced to accept, however much one may detest the consequences it may lead to.

Factors Influencing the Quality of Ores

In the process of improving the quality of iron ores the most important impurity to be removed is usually silica, and the amount which can legitimately be expended on a beneficiation process to reduce the silica content is obviously dependent upon the increase in value of the ore after it has been treated. The price which can be obtained for a treated ore must chiefly be based upon the cost of making pig iron from it, so that an approximation as to the effect which any decrease in the silica content of the ore has upon the cost of making pig iron is a highly important guide in estimating the probable average gain which will result from subjecting an ore to a beneficiation process. Three of the metallurgists associated with the U.S. Bureau of Mines, bearing in mind that practically no data seem to be available in connection with this particular relation, have lately set themselves to work out a method whereby the average relative values of ores can be quickly found; and while the method itself—which is a graphical one—is ingenious, it is perhaps some of their incidental remarks and conclusions which are of even greater value and interest.

So far as the presence of silica is concerned, it has to be remembered that it plays its useful part, and it is generally agreed that sufficient slag must be produced not only to permit of a proper degree of sulphur removal, but also to ensure the free working of the furnace. It is to be recalled, in fact, that in smelting high grade iron ore the operators have occasionally added silica to the charge, the main object being the production of the most fusible slag that will give the necessary de-sulphurisation of the iron. The Bureau of Mines workers, it may be noted, assume that 1,200 lb. of slag per ton is the desirable volume. It is, however, in drawing comparisons merely on the ultimate analyses of ores that the operator is likely to be misled. For instance, if we have two ores of identical proportions of natural iron, but in one case the silica content is 12 per cent. and in the other case it is 8 per cent., then it is obvious that from the standpoint of iron content both are of equal value. But in the second instance the ratio of silica to iron is lower, and it is apparent that it will cost less to make a ton of pig iron from this material than from the other, even though the values of the ores as deduced from the standard tables are the same. This is only one of the many factors influencing the final result upon which the authors dwell, but they make it clear that ordinary methods of attempting to compute the value of an ore from its natural iron content alone do not give true relative values, and that some other system, fair to both buyer and seller, is needed.

Breaking Bread Together

The rather daring experiment of officially dining together, made by the Society of Chemical Industry and the Chemical Industry Club last week, produced no untoward results. On the contrary, the memory and the reports of it are all entirely pleasant. The attendance was very large, and included ladies for the first time. The speeches were so numerous that only the most skilful of chairmen could have got them into the time; as it was, Mr. Woolcock's achievement nearly equalled that of a famous sports starter, who made a point of starting each race exactly to time, even if the preceding one was not finished. The quality is generally reported to have been excellent, though some of the utterances perhaps were spoken a little too much into the beard, and failed to reach the expectant ears of the more distant listeners. The musical programme, again, was forced a trifle into the background by the oratory, and there was too little margin for unbending into mere frivolous conversation, usually the most improving influence of all on such occasions. The only fault was that the promoters tried to give too much for the money; to be fed, spoken to, and sung to incessantly for some hours dulls the appetite. Divide everything by two—or even three—except the wine and food, and the next experiment should be perfect. Already the dinner has raised a hope of some distant occasion when all the chemical organisations will sit down together—the question whether this ecumenical gathering should be at Wembley or on Salisbury Plain being for the moment left open. Seriously, these fraternal gatherings are having a good effect in tending to break down denominational barriers and making the societies realise how much they have in common.

Cellular Rubber as an Insulator

There is not much question about the fact that were it possible to effect substantial improvements in existing methods of heat insulation very considerable savings might annually be effected in coal and other fuels. The problem, of course, presents itself from two angles, namely, in the conservation of heat within the walls of certain industrial plant such as furnaces, retort benches, etc., and in the retention of cold in such cases where low temperatures are produced artificially, as in systems of cold storage. So far as requirements and the efficacy of various insulating methods falling under the first category are concerned there still seems to be a good deal of difference of opinion; and, if we recollect rightly, it was Dr. J. W. Mellor who, in speaking of the use of porous materials such as diatomaceous earths, contended that there may be a reversal in conductivity at about 1000° C. in the sense that the more porous bricks become better

conductors than the same bricks of less porosity. Looking at the other side of the question, however, we can now turn to the admirable report which has lately been issued by the Food Investigation Board, and which contains an account of the experiments, carried out with an exceptional regard for accuracy, by Dr. Ezer Griffiths. It is not necessary to review the work which has been continued with the more or less accepted materials, but attention is particularly attracted by experiments which have been conducted with a novelty among insulators, namely, cellular rubber. This is a material in which rubber is expanded by gas under pressure, the process resulting in a mass consisting of a number of self-contained cells, each of which is bounded by thin rubber walls. It is not, therefore, a sponge in which passages merely pass from end to end, and some idea of the difference may be gained from the fact that while ordinary rubber sponge has a density of 14 lb. per cubic foot, the density of the cellular material may be so low as 3.7 lb. A number of experiments conducted with the material in order to determine its abilities as an insulator seem to place it in a very advantageous position as compared with, for instance, granulated cork, the most remarkable fact being the saving in insulating effect per pound of material used. It can be quite understood, however, that those responsible for the report are not at this stage likely to be so imprudent as to express hopes which it may not be possible to substantiate. Albeit, it is to be trusted that when data from long-period tests are available they may permit of a more precise statement, for the whole problem of insulation is one the importance of which in certain branches of industry we cannot afford to overlook.

"Plain English"

DR. E. F. ARMSTRONG, in his recent address to American chemists at Toronto, talked, as usual, good chemistry, and also, as usual, good sense. His plea for the use of "Plain English" even in the discussion of chemical problems is one which will appeal to many. It seems to be assumed at times that the more technical and obscure an address or paper is the more likely it is to impress hearers with the author's learning. The effect is invariably the reverse. A real master of any subject is generally able to make his meaning clear even to a layman of average intelligence, and some recent examples in our own columns have shown how the most technical questions can be written on with a sense of clarity and style good enough for the severest literary standards. The habit, however, of talking and writing in the language of the laboratory—a habit which may be due to mental indolence or want of imagination—is still much too common, and Dr. Armstrong is not exaggerating when he says that frequently "one chemist is lost in listening to another." On the value of international exchange visits, which was mentioned at the same meeting, there is no need to dwell. From every point of view it is a gain to preserve an intimate personal and scientific intercourse between the chemical interests of Great Britain and the United States, and our American friends may rest assured that the feeling in favour of it is as cordial here as among themselves.

Points from Our News Pages

A practical discussion on "Chemical Works Costs" appears on p. 516.

Chemical trade returns for October show a decrease in both imports and exports compared with last year (p. 518).

Letters are published on "The Luton Chemical Works Strike" (Mr. A. J. Gillian), and "The Ramsay Memorial Department" (Mr. S. C. Chigison) (p. 519).

The Chemical Industry Dinner is fully reported (p. 520).

Dr. A. van Rossem's paper on "The Development of Rubber Latex" is dealt with on p. 522.

Practical observations on the methods of controlling varnish tests are given (p. 523).

Dr. Armstrong's speech at Toronto embodies many interesting points (p. 524).

Our London chemical market shows a general improvement in tone (p. 532); the Scottish report reveals no important change, but the heavy chemical market is fairly satisfactory (p. 535).

The Calendar

Nov. 24	Royal Society of Arts: Cantor Lecture (I.): "Modern Colour Problems." Dr. L. C. Martin. 8 p.m.	John Street, Adelphi, London, W.C.2.
25	Hull Chemical and Engineering Society: "Adsorption." A. V. Slater.	Grey Street, Park Street, Hull.
25	Sir John Cass Metallurgical Society: "Works Sampling." T. G. Howard.	Aldgate, London, E.C.3
26	Institution of the Rubber Industry (Manchester Section): "The Treatment of Rubber Previous to Vulcanisation." Dr. S. S. Pickles.	Textile Institute, 16, St. Mary's Parsonage, Manchester.
27	Society of Dyers and Colourists (Midlands Section) — Joint meeting with the Society of Chemical Industry: "Acetate Silk." G. H. Ellis.	Nottingham.
27	Society of Dyers and Colourists (Midlands Section). Joint Meeting with the Society of Chemical Industry: "Acetate Silk." Dr. G. Holland Ellis.	Nottingham.
Dec. 1	Institution of the Rubber Industry (London Section): "Research Work on the Plantation." Major B. J. Eaton.	Engineers' Club, Coventry Street, London.
1	Royal Society of Arts—Cantor Lecture (II): "Modern Colour Problems." Dr. Louis C. Martin. 8 p.m.	John Street, Adelphi, London.
1	Oil and Colour Chemists' Association. Joint Discussion with the Society of Chemical Industry (London Section): "Protective Paints."	Burlington House, Piccadilly.
1	University of Birmingham Chemical Society: "The Bohr Theory of Atomic Structure." R. E. Kellett.	Edgbaston.
2	West Yorkshire Metallurgical Society: "The Corrosion of Engineering Materials." 7.30 p.m.	George Hotel, Huddersfield.
3	Leicester Literary and Philosophical Society, Chemistry Section: "The Action of Light on the Photographic Plate." Dr. T. Slater Price. 8 p.m.	The Museum, New Walk, Leicester.
3	Society of Public Analysts. 8 p.m.	Burlington House, Piccadilly, London.
3	Society of Chemistry Industry (Nottingham Section): Paper on Glass by Professor W. E. S. Turner. 7.30 p.m.	University College, Nottingham.
4	Society of Dyers and Colourists (West Riding Section): "The Moth Proofing of Textiles and Other Wearing Apparel." C. O. Clark.	Bradford.
4	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.

Chemical Engineers Discuss Costing Problems

Chemists and Accountants at the Chemical Engineering Group

On Thursday, November 13, a discussion on Costing Problems in Chemical Works was held by the Chemical Engineering Group, at the Engineers' Club, London. A number of costs accountants had been specially asked and a number of valuable contributions were made by them and the ordinary members of the group. Many of the latter, however, admitted to finding the subject somewhat above their heads. Nevertheless others found the meeting a valuable one. The president of the Society of Chemical Industry, Mr. W. J. U. Woolcock, was in the chair.

In his paper on "Chemical Works Costs," with which Mr. F. M. Potter, B.Sc., F.I.C., opened the discussion, he pointed out that in chemical works there has been a tendency to lose sight of the fact that the costs accounts are an integral part of the accountancy system of the works, the total expenditure of the works being subdivided, coded and shown in the form of tables which demonstrate relative expenditures per unit weight or volume of output of each of the products manufactured. Thus the costs system must be controlled by the works accountant, the figures used must be based on the financial and stores ledgers, and the total expenditure taken up on the costs accounts for a given period must agree on balance with the wages and other expenditure shown on the accountant's books, together with the value of stores issued during the period. The value of raw materials used must be obtained from stock statements, and not from the estimates of the quantity used as given by the plant chemist or foreman.

The costs records must show the exact use which has been made of material consumed, precise work on which labour has been employed, and the actual incidence of operating charges. For the general factory on-cost charges, we had to decide upon a basis which will provide an intelligent and reasonably fair and accurate distribution. The system of records and costs statements, in addition to showing the production of each section and its unit cost, must lend itself to the promotion of the economic use of materials and to the restriction to the fullest desirable extent of the cost of operating charges and the burden of on-cost expenses. To be of value to the technical staff, the records must be available shortly after the close of each period—monthly costs records, for instance, being completed before the tenth day of the succeeding month. The expenditure on this department is necessary in order to obtain efficient administration. The expense of the additional office staff necessary for the production of costs statements will be relatively very small as compared with the economies secured in manufacture if the system is properly used. Proper systems of works costs are not necessarily synonymous with works efficiency, but are a stepping stone in that direction.

Co-operation Between Technical and Accounting Staffs

The development and smooth working of the system depends upon the willing co-operation of the technical staff with the accountant. The accountant must so sectionalise his books that the various items of expenditure are readily transferable to the agreed process or code accounts for recalculation into the required form by the costs department clerks. The technical staff must advise as to the most useful costs headings and assist the development of accuracy by supervising and correcting the coding of the stores requisitions. The engineer will be called upon to allocate proportions of the electric power, water and steam-raising expenditure to the process accounts, basing the allocation percentages upon the best possible information available as to the respective plant usages.

Reliable costs accounts, continued Mr. Potter, filled a number of definitely defined purposes. The salesman would be placed in a position to determine the minimum selling price of the products in order to reap a profit on the transaction, or where the selling price of the article is controlled by a market quotation fluctuating with the market demand and supply, he will be able to discuss with the works management the possibility of reducing or increasing output accordingly as there is a prospective loss or profit on the sale.

The process manager will concentrate his attention upon obtaining maximum output under efficient working conditions, the improvement of the steady development of chemical efficiencies, and the effecting of economies in manufacturing charges. His ultimate aim should be the theoretical yield on raw materials with due regard to capital expenditure involved in increasing the efficiency of the process, and a steady downward trend in the other costs factors towards the zero axis. This purpose is the most important use to which the costs accounts can be applied. The costs accounts are also of great value to the research worker, who is able to base his estimates for the manufacture of a new product on the rate of expenditure on the process already in active work which bears the greatest similarity and thus take up reasonable allowances for unforeseen expenditure which cannot be estimated from laboratory conditions. The relative economies to be effected by the use of by-products, which include waste heat and water, are indicated. Lastly, the mere fact that a system of records exists, exerts an important moral influence on the works staff, and has a retarding effect on the careless use of labour and materials.

Mr. Potter then went on to describe the method of costing adopted in a number of Government TNT factories for the nitric acid and TNT processes, which illustrated very well the economies in operation achieved by accurate costing methods. These details have already appeared in an article in The Chemical Age, so they need not be further referred to here. The references are June 2, 1923, p. 588, and June 9, 1923, p. 612.

In conclusion, he observed that the methods indicated could not be installed in a number of days or weeks, but represented a high objective towards which steady progress could be made. To make useful deductions from the costs returns it was necessary to have a clear knowledge not only of the method of compiling them, but also an understanding of the nature of the process and of the materials involved.

Mr. Marris's Paper

The second contribution was by Mr. H. C. Marris, M.I.Chem.E., entitled, "Some Practical Notes on Costings, with Special Reference to Chemical Works." First he pointed out that there was an aspect of costing which perhaps was not sufficiently emphasised, yet which was of such practical value that just from that aspect alone it might pay to put in a properly designed costing system, even if it never gave any costs at all. That point of value was the general tuning up of a works which resulted from the increased attention to details of organisation necessarily accompanying the installation and the carrying out of a costing system. Mr. Marris mentioned one or two remarkable cases of inefficiency disclosed by the introduction of a costing system.

With a satisfactory costing system properly used the workpeople were better controlled and more economically employed, the foremen were kept up to their work and were given a useful tool for fulfilling their duties, whilst it was brought home to the management by the reiteration of costs—costs—costs, that the manufacture of chemicals was but a secondary purpose of a chemical works, the primary one being to make dividends.

Costing was a useful check on various activities in a works, but how could costings itself be checked? The balance-sheet might serve this purpose, and undoubtedly did so as regards the direct costs such as materials, wages and salaries, but indirect costs at once introduced difficulties; as, for instance, with depreciation. The costings depreciation was based on the probable life of a machine or plant, whilst the balance-sheet depreciation figure was based on the probability of it passing the Surveyor of Taxes. Again, the costing system was based on absolute and definite cost, whilst the balance-sheet was affected by the policy of the Board of Directors, which policy might fluctuate from year to year, and if the costing system was based on the balance-sheet figures a comparison of one year's costs with another became useless or positively misleading.

A works might be equipped with a costing system which has been designed and installed by an accountant who was primarily an office man, very able in his way and an expert on costings, but with a very limited, or totally non-existent

knowledge of works details and difficulties, and he was compelled to depend on the technical staff of the works for the carrying out of his system. The members of the technical staff in their turn, though perfectly competent in their own lines, might know nothing of costings and its particular details and difficulties.

The works staff throughout, workpeople, foremen, managers, even directors, may all have to be trained by the costings man, and their difficulties realised and the necessary assistance rendered to overcome them. The technical staff with the best possible intentions could quite easily send through to costings the details of information in a wrong way, believing that they were fulfilling the wishes of the costings man who, in his turn, would be satisfied with these details as he would have no reason to suppose they were misleading.

A technical man might dislike the introduction of a costing system as an unmitigated nuisance or as an attempt to control his managerial activities and to curb his authority, or even as a spy system, and he would do his best to oppose and discredit costings in ways which only a man conversant with works details could discover. The human element had always to be reckoned with in any system.

Some Causes of Error

Stocks might be inaccurately rendered, labour might be transferred from one department or process to another, but the wages shown as formerly; capital charges might go through as repairs, a department might extend into other buildings vacated by lack of work by still another department and costings not be informed, machines or plant might be transferred from one department to another, perhaps in the first instance as a temporary measure, but ultimately to stop, and costings might know nothing about it. Unless the costings man knew sufficient of works matters to be able quickly to discover and check the bad results of ignorance, malevolence or carelessness, the mistakes in the costs due to these causes would increase in geometric rather than in arithmetic progression.

Was not an accountant apt to think more of the convenience of his books than of the practical requirements of the works? For instance, a favourite way of dividing the annual overheads was by four to give the amount for a quarterly costing or by twelve for a monthly costing. Months or quarters did not contain equal numbers of working days. Was it not better to ignore the calendar division of overheads and divide the overheads of a department by the number of actual working days in that department in the course of the year? In this way an overhead charge per working day was obtained and a periodic, monthly or quarterly charge could be obtained by multiplying this day charge by the number of working days in the period required. It was possible that we owed the accountants the credit for originating costings, but the tendency at present is for this special branch of work to be done by costings and works accountants, who are specialised, but still accountants. Would not the costings in future lie in the hands of the technical man, especially the technical chemist who would take costings as an essential part of his ordinary training?

A Weekly Costing System

Mr. C. S. Garland, opening the free discussion, said that his experience, also, had been that much of the allocation of on-cost charges by factory accountants was unnecessary. It depended, of course, largely on whether the factory dealt in one product only or in a large number of products. Works and cost accountancy were originally introduced by the engineering industry on account of repetition work, and particularly on account of the necessity for estimating, and in that case estimating was an important part of the work of the costs accountant. On the other hand, if a works dealt only in one article, the most satisfactory result was obtained by taking a definite period—he used to take a week—and averaging the cost price of an article and comparing it with the selling price of the same article as shown by the ledgers. Another matter was the question of intermediate processes in the course of the manufacture of the main article, where these intermediate products could be purchased on the market. The only satisfactory way of dealing with these was to charge them up at the market price. That method enabled them to see whether these intermediate processes were worth keeping going; it might indicate, for instance, that a refining process ought to be abandoned and the article bought on the open market.

Mr. Thomas Haworth (Lever Bros., Port Sunlight) said the fundamental point about this whole question was that it is entirely wrong to think about plant and processes because, efficiency in any business was due to the people working in it, and we should only get efficiency in so far as the people worked satisfactorily. Therefore, what had to be measured was not so much the efficiency of processes or plants, but what the workers were doing. The sooner, therefore, we dealt with costing on this personal basis the sooner would we get satisfactory results. As to the form in which costing information should be supplied, his view was that a lot of the information shown to the engineer or chemical engineer was not necessary for the purposes of control, except by the higher executive. A large number of the people in a chemical works were engaged purely on operation, and their concern was with the two points of operating efficiency and technical efficiency, and these things could be measured in terms of units of output per hour much more easily and readily than by any method of seeing £ s. d. figures. The only person really interested in the final cost of the product was the individual right at the top or the people connected with the selling side. With regard to the cost of electric power, why should not a factory deal with this on the basis of a power station, and charge a price per unit for the different processes? In this way they were not transferring all the inefficiencies of the power plant into the process plant. He did not know whether to treat Mr. Marris's paper seriously or not, but he was satisfied that Mr. Marris had been putting up his own bogies, and had been fighting something in the paper which was a figment of his own imagination, very largely.

Co-operation Between Chemists and Accountants

Mr. A. S. Vago (Messrs. Boake, Roberts and Co.) said that as an accountant he found it difficult to deal with Mr. Marris's paper because he did not deal with any definite costing point. His own experience was that the technical staff was only too willing to co-operate with the accounting staff, and to give all the information asked for. Moreover, they did this so that they might be able to come to headquarters at some time for appreciation in some form for the work they carried out. Mr. Marris was quite wrong in suggesting that an accountant would want to divide his costs into four periods to make up a year when these periods would necessarily vary in the number of weeks. To take periods which consisted of 12 weeks and 14 weeks and equalise out the costs, would be the work not of an accountant but of a fool. Would Mr. Potter say that the cost given by the system which he advocated would be unvaried by circumstances? For instance, suppose the average output was 100 tons per month, and prices were, as at present, cut by competition, would it be likely that a further cut could be made if orders for a higher output would result?

Mr. N. Swinden, speaking as a chemical engineer, said his experience was that to ascertain the direct charges is a simple matter; the real difficulty was to ascertain the effect of the on-cost. On-cost was the basis of all accurate and scientific costing. Many works were trying to remove the on-cost as much as possible, and in his case the rent was charged on the basis of so much per square foot which the plant occupied. They had even got the chemist and the draughtsmen to book their time for the particular jobs and the result was to prevent an increase of unnecessary staff. His view was that the main purpose of costing was not so much to find out the margin between selling price and cost, but to bring enormous pressure on everyone in the works, from the managing director to the office boy, in order to cut down every sort of waste. In a chemical works there was a large amount of money spent in research, but he was not aware of any deliberate concentrated effort in order to find out the actual cost of research. Generally speaking, the cost was colossal. Much work was done which was not likely to give results, but the experiments were usually sandwiched between the different departments. His own firm had attempted to put research work upon an entirely different basis, and the charges were now allocated under three main headings: capital, research,

and maintenance, and it was surprising to find how large the research account was.

The Problem of Intermediates

Mr. H. Calum (Boots Pure Drug Co.), in a brief account of the methods adopted by his firm, said that the first essential was to take account of all material. All material was dealt with through proper requisition forms which were dealt with by the transfer office, and when the accounts were got out they were checked through carefully against the transfer office records. In regard to vacuum and freezing, this could not be metered, and so an hourly rate was charged against the particular plant being served by the vacuum or freezing machines. Maintenance was charged directly against the job requiring the repair, except routine work such as oiling machinery, repairing belts, etc. On-costs were kept as low as possible, and the amount charged to the chemical works was a fair proportion of the charges involved in selling, advertising, etc., rent, rates, taxes, and so on. In an endeavour to get a quick record of the cost of a particular process, his firm arranged not to close the works orders all on the same day, but to stagger them throughout a period. The problem of charging up intermediates was a difficult one, and there was one thing which operated against charging them up at market price. If during the process the price of an intermediate approached the market price, it must be remembered that in that price was a certain amount of labour and overheads, therefore it would be fairer to credit the cost of intermediates at market price plus something for labour, overheads and on-cost. That was what his firm did.

Miss M. S. Neale (cost accountant, Messrs. Allen and Hanburys, Ltd.) said that one of the greatest difficulties in chemical costing was to bring chemists down to results in money. The question to be considered was " What can I sell this article for," and she thought that a little less of the technical and a little more of the commercial would make all the difference. The cost accountant should be regarded as a person with an intimate knowledge of works accountancy organisation and some knowledge of the industry he was engaged in. It was impossible for a chemist to control the works and also the cost office.

Mr. A. M. O'Brien (National Oil Refineries, South Wales) said that when his oil refineries were started he had to begin an accountancy system afresh. In order to get over any feelings of jealousy among the staff, he arranged for a weekly meeting of the staff, and told them that they could quarrel as much as they liked at the weekly meeting, but that during the week on the works they would have to work together. The result was that after the first few meetings everything had gone harmoniously all the time.

The Problem of By-Products

Mr. Gwyn (Messrs. Newton, Chambers and Co.) said he was neither a chemist nor an engineer, but a costing man, and he had been disappointed because he had come to the meeting hoping to hear what should be done in a case where there was one prime material with half a dozen or more by-products, but he had heard nothing to enlighten him upon such a case.

On the motion of the Chairman, seconded by Mr. F. Rogers, a hearty vote of thanks was accorded the authors of the two papers. Mr. Marris said there was no occasion for him to reply in detail, because it seemed to him that the various speakers had largely answered each other.

Mr. Potter said Mr. Garland's suggestion as to a weekly cost sheet might be very useful when only one product was being handled, but it was a different matter when there were 20 or 30 different items, although they might all be interlinked. As to Mr. Gwyn's remarks, they seemed to be covered by the case of tar distillation mentioned in the paper. In that case he had determined the distillation of tar per ton.

Mr. Gwyn : Sold or produced ?

Mr. Potter said it was per ton treated. He determined the cost per ton distilled, and that was the operating cost. At the other end of the process this product was valued at the market price and compared with the cost and then it was charged up on a definite basis.

On the motion of Mr. A. E. Alliott a hearty vote of thanks was accorded to Mr. Woolcock for presiding.

Chemical Trade Returns for October

Imports and Exports Below Last Year

As noted last week the Board of Trade returns for October show a decrease in both imports and exports of chemical products compared with last year, though in both cases the figures are higher than those for September. The imports were valued at £1,340,961, an increase of £23,949 over September, but £259,514 below October, 1923. Exports totalled £2,162,962, being £165,507 higher than September, but £409,467 lower than October last year.

The figures below show that the decrease in exports has been remarkably evenly spread over the various products.

Imports for October

INCREASES.

		1924.	1923.
Acid, acetic	tons	1,126	537
Acid, tartaric	cwt.	986	60
Bleaching materials	cwt.	8,751	2,285
Borax	cwt.	6,717	2,555
Calcium carbide	cwt.	89,787	87,509
Potassium compounds, except nitrate	cwt.	448,859	325,474
Sodium nitrate	cwt.	131,699	109,142
Cream of tartar	cwt.	4,083	2,871
Zinc oxide	tons	611	451
Alizarine dyestuffs	cwt.	2,982	1,062
Unspecified coal tar dyestuffs	cwt.	5,565	3,854
Natural indigo	cwt.	87	nil
Barytes, including blanc fixe	cwt.	56,992	49,135

DECREASES.

Crude glycerin	cwt.	1,225	3,213
Distilled glycerin	cwt.	30	311
Red lead and orange lead	cwt.	1,946	2,577
Nickel oxide	cwt.	2,607	6,656
Potassium nitrate	cwt.	5,335	12,352
Sodium compounds, except nitrates	cwt.	18,043	24,462
Intermediate coal tar products, including aniline oil and salt, and phenyl glycine	cwt.	5	198
Synthetic indigo	cwt.	nil	190
White lead	cwt.	8,495	10,561
Unspecified painters' colours	cwt.	56,835	66,598
Essential oils, except turpentine	lb.	355,900	442,010
Turpentine	cwt.	29,429	100,686
Mercury	lb.	nil	179,779

Exports for October

INCREASES.

		1924.	1923.
Bleaching powder	cwt.	34,953	31,918
Crude glycerin	cwt.	17,457	9,643
Sodium carbonate, etc.	cwt.	466,687	375,804
Dyestuffs other than coal tar	cwt.	4,955	4,819
White lead	cwt.	16,387	15,988

DECREASES.

Acid, sulphuric	cwt.	2,252	2,707
Acid, tartaric	cwt.	1,278	2,422
Ammonium chloride	tons	246	266
Ammonium sulphate	tons	25,950	26,587
Anthracene	cwt.	nil	3,960
Benzol and toluol	galls.	1,680	424,599
Carbolic acid	cwt.	5,429	15,694
Naphtha	galls.	4,274	29,456
Naphthalene	cwt.	763	21,314
Tar oil, creosote, etc.	galls.	4,259,049	7,250,372
Unspecified coal tar products	cwt.	33,087	38,061
Copper sulphate	cwt.	71	340
Distilled glycerin	cwt.	9,532	9,653
Potassium chromate and bichromate	cwt.	2,180	3,815
Potassium nitrate	cwt.	1,284	1,735
Unspecified potassium compounds	cwt.	3,002	3,810
Caustic soda	cwt.	131,934	145,967
Sodium chromate and bichromate	cwt.	4,229	5,190
Sodium sulphate, including saltcake	cwt.	173,519	187,031
Unspecified soda compounds	cwt.	42,094	42,132
Zinc oxide	tons	165	240
Synthetic coal tar dyestuffs	cwt.	10,553	16,224
Barytes, including blanc fixe	cwt.	843	8,148
Paints and colours, ground	cwt.	28,433	31,909
Paints and enamels, prepared	cwt.	30,641	36,089
Unspecified painters' colours	cwt.	53,327	63,582

Ramsay Memorial Department

To the Editor of THE CHEMICAL AGE.

SIR,—The report of the proceedings at the formal opening of the Ramsay Memorial Department of Chemical Engineering at University College, which appears in your current number, contains a point to which I desire respectfully to draw your readers' attention.

Therein it is stated that Mr. W. J. U. Woolcock said "that the laboratory was the *first* laboratory in this country for the training of a type of man which must be produced." As one of those who received their training in the Chemical Engineering Department of the Imperial College of Science and Technology, London, you will share my very great surprise on now being informed that the *first* laboratory in this country for the training of the chemical engineer was formally opened last Wednesday!

Assuming that I have not misinterpreted the significance of the wording, it must be recorded that the above statement, attributed to Mr. Woolcock, is incorrect.—I am, etc.,

40, Upper Park Road, Hampstead, N.W. S. C. CHIGISON.

Luton Chemical Works Strike

To the Editor of THE CHEMICAL AGE.

SIR,—Being regular subscribers to your journal, and noticing your publication of Messrs. Laporte's correspondence, perhaps you will be good enough to publish the observations hereunder, representing our point of view.

This dispute, one of the biggest and most bitter the industry has seen, should never have occurred. From the beginning our attitude and conduct has been to carry out the legitimate functions of a trade union, viz., to organise the men, to create a machine for collective bargaining and, therefore, to bring about fair and reasonable working conditions and wages for the workers with the minimum of friction. The firm's attitude, on the other hand, has been openly hostile, first to the men for daring to join a trade union, and having been forced to grant what is a right of the men, reasonably conceded by all other important chemical manufacturers, the management then objected to the men functioning as organised workers and denied them collective bargaining.

What was the reason for the firm's attitude? In brief, to maintain full and unfettered control over their workers, working for wages and under conditions that are unfair, both to the men and to the chemical industry generally, in so far as they give Laporte's an unfair advantage in competition against other manufacturers in this country making some of the products of the firm. Anyone without knowledge of the chemical industry would think that no other chemical firm in the country was subjected to foreign competition, while the facts are that Laporte's are subject to less intensified competition than general chemical manufacturers by the very nature of their chief products.

Prior to the dispute the majority of the men received only 8¼d. to 10½d. per hour against other chemical manufacturers who now pay 1s. to 1s. 4d. per hour for similar labour, an obvious difference of anything from 3¼d. to 6d. per hour. Side by side with this difference in direct wages costs most of the important firms provide good mess, bath and cloak rooms and many other benefits under workers' welfare schemes.

Perhaps the correct relation to the workers' conditions at Laporte's can be judged with the dividends paid by the firm as follows:—1917, 37½ per cent.; 1918, 32 per cent.; 1919, 32 per cent.; 1920, 22½ per cent.; 1921, 6 per cent.; 1922, 10 per cent.; 1923, 10 per cent.; 1924, 11 per cent.—an average of 20 per cent. for the years stated.

The firm's comparison of their wages and those generally operating in Luton will not be taken seriously by anyone in the chemical industry, or in Luton, because it is recognised that no labour in Luton, except chemical labour, is comparable either in strenuousness, disability, or risk. The demands of the men through their Union will be judged by the industry and of that judgment we have no fears.

The men claimed roughly 2d. per hour increase, provision of mess and bath rooms, with recognition of the union and shop stewards. Financially the cost would not have exceeded £4,000 per year, all productive and distributive cost remaining constant, but I have no doubt that the firm's effort to maintain existing wages and conditions has cost them a very much higher figure, the effects of which will be felt for many years to come.

The dispute has been officially terminated by my Executive Council, but only upon representations made by our members involved, but I think it ought to be stated that this dispute has not settled finally the questions of trade union organisation and conditions for the workers. As far as my Union is concerned the conflict with this firm, started in 1924, will go on for years, if need be, until the management are convinced by experience, as many other firms have been, that trade union wages and working conditions, as determined by standards accepted by the industry, are the only things that can secure for the firm lasting peace and prosperity.—I am, etc.,

ARTHUR J. GILLIAN,
General Secretary of the National Drug and Chemical Union.

149, Newington Causeway, S.E.1.

Studies in Chemical Theory

Society of Chemical Industry: Birmingham Section

THERE was a good attendance of Midland chemists at the opening meeting of the session of the Birmingham and Midland Section of the Society of Chemical Industry, which took place on Tuesday, November 11, at the University of Birmingham. It was announced by Mr. George King, the hon. secretary, that chemists may now join the Society without the payment of the entrance fee, which was formerly one guinea.

A paper, entitled "Studies in the Acenaphthene Series. Part I," was given by Dr. Gilbert T. Morgan and Mr. H. M. Stanley. Hitherto only one of the four theoretically possible aminoacenaphthenes has been described, namely 5-aminoacenaphthene (I) discovered by Quincke (*Ber.*, 1888, 21, 1455), but 4-aminoacenaphthene (VI) has now been obtained by the authors.

The 5-aminoacenaphthene has a melting point of 108° C. and crystallises as needles. On diazotising it gives a dark blue coloration with the nitrous acid, and by adding alcoholic ferric chloride a blue colour was obtained, which was inhibited by excess of mineral acid. The newly prepared 4-aminoacenaphthene, on the other hand, crystallises in acicular prisms melting at 87° C., and remains colourless on diazotisation or adding alcoholic ferric chloride.

In connection with their researches on residual affinity and co-ordination, Dr. G. T. Morgan and Mr. V. E. Yarsley presented a paper on the "Interactions of Trimethylstibine and Platinic, Platinous, and Palladous Chlorides."

Molybdenum Salts

Dr. Wardlaw, in presenting a paper on researches on molybdenum salts which were being carried out at the University of Birmingham in conjunction with Messrs. F. H. Nicholls and R. L. Wormell, pointed out that at the present time only one molybdenum salt found extensive use, namely ammonium molybdate, in which molybdenum had a valency of six. Nevertheless many well-defined salts existed with valencies of five, four, three, and two. Only by additional knowledge would further openings be found for molybdenum derivatives. The present research work dealt with tervalent salts, which were of interest from the point of view of chemical theory in that molybdenum, being associated with chromium in the periodic classification, should show interesting analogies in its tervalent derivatives with the well-known chromium salts. Furthermore, such substances should have powerful reducing properties and uses as mordants.

By electrolytic reduction of molybdenum trioxide dissolved in hydrochloric and sulphuric acids solutions had been obtained from which tervalent sulphates and chlorides had been isolated. The new substances had powerful reducing properties, and in the case of the chlorine derivative comparative stability.

Higher Fatty Acids

In a paper on their "Observations on the Higher Fatty Acids," Dr. G. T. Morgan and Mr. Arthur R. Bowen, the authors, described a research on the acids of cacao butter as a source of eicosanic acid. For comparison, pure *n*-eicosanic acid was prepared by potash fusion of erucic acid (Fitz, *Ber.*, 1871, 4, 444) and a series of mixed melts with pure stearic acid worked out.

The Chemical Industry Dinner

Society of Chemical Industry and Chemical Industry Club Combine

THE joint dinner of the Society of Chemical Industry and the Chemical Industry Club, which was held on Friday in London at the Hotel Victoria, was in many ways a success. It was the first time that the two bodies had combined, and it was the first time ladies had been invited. Owing to the arrangement of the room with round tables, many pleasant friendly parties were made up among the 300 or so members and guests who were present. Mr. Woolcock was in the chair, and there could certainly be no better chairman. He is to be congratulated on keeping the long programme of speeches and musical items going, in a delightful yet business-like and formal way. In his first remarks he struck a note which showed that though the business of the evening had to be got through, it was not to be made dull. This was done not directly, but by suggesting that he wanted to be sure that the waiters were standing fast and the guests had stopped talking before he gave the toast of "the King."

Sir Richard Glazebrook, in proposing "the Chemical Industry and the Profession of Chemistry," made an appropriate speech as the opener of the programme. His review of the present position showed how much we had advanced during the lifetime of the older chemists, and Sir Richard attributed this to three things, the war, the Institute of Chemistry, and the Wembley Exhibition. Professor Henderson in replying also struck the same note. As chemists, the guests had much to be thankful for already in the advancement of the profession.

The Chemistry House scheme was referred to more than once. Professor Henderson cleverly pointed out the need of some central headquarters for chemists so that they might speak with a united voice, without actually bringing in the words "Chemistry House." Mr. Woolcock said that though not so much had been heard of this scheme lately, he thought more was being thought about it than ever. Mr. Percy Ashley at the close of the evening also stressed the need of chemists working together so that they might speak with a united voice to the Government. Mr. Chaston Chapman also had something to say about this matter, and he suggested a slogan —or if this seemed an unsuitable term, a motto—"Understanding and Co-operation." That chemists can work together in spite of what some people have said was made clear by Mr. Woolcock, who said he had found it one of the easiest things in the world. Mr. Coley pointed out that the success of the Club also showed the same thing, although Professor Armstrong, he said, would have us believe that all chemists wanted was beer—and more beer. The Club, he admitted, was "a place within the meaning of the Act."

A number of stories were told during the evening—Mr. Chaston Chapman does not tell stories, he reminds his hearers of them, but the effect is indistinguishable. The stories harped on Scotchmen and St. Peter mostly, but Mr. Woolcock had a Ford story. One or two speakers let it out that they had received a warning, in the form of a letter, as to the nature of the censorship necessary owing to the presence of ladies this year. Mr. Coley deliberately skated on some thin ice, much to the ladies' amusement. At the same time he took the opportunity of reminding the ladies that it would make for happiness in the home if they allowed their husbands to go to the Club, and for happiness in the Club if they did not allow them to do it too much.

We heard one or two criticisms of the arrangements, the most general being that there were too many speeches, and the delightful musical items were almost lost among them. The quality of the speeches was satisfactory, but the complaint that there could be too much of a good thing was, we think, a reasonable one. The other complaint we heard was somewhat unusual, but worth repeating. It took the form of the somewhat revolutionary suggestion that there ought to have been dancing, and that you cannot really expect ladies to enjoy a dinner nowadays unless there is. As we know that chemists can dance with some grace—we have seen them —the idea might well be tried next year, if, as is to be hoped, another combined dinner is held, and we commend it for consideration.

Summary of the Speeches

The first toast, "Chemical Industry and the Profession of Chemistry," was proposed by Sir Richard T. Glazebrook, F.R.S., who, after referring to the book, *Chemistry in the Twentieth Century*, edited by Dr. Armstrong for the purposes of the Wembley Exhibition, said there was no doubt whatever that there had been a complete change in the life of the world as the result of the development of scientific methods and their practical applications. Of the sciences which had led to that development and change, chemistry was not the least. Some would claim it to be the greatest, and certainly a very wide field could be claimed for the application of chemistry. The productiveness of human labour at the present time was dependent on the advance of scientific knowledge, and in this chemistry was playing no small part. How large a part chemistry was playing had been shown in an admirable manner at the Wembley Exhibition, and in an even more convincing manner by the book to which he had just referred. Professor Smithells' letter in *The Times* on the previous day reminded them of another part of chemical work to which the country owed an enormous debt. They would not be there that evening but for the work of the late Lord Moulton and the chemists associated with him in the production of high explosives, or for the work of Hartley and those associated with him in devising the means whereby chemical warfare and gas attacks were finally overcome. Though chemical warfare was a hateful thing, he was entirely in accord with Professor Smithells that there should be no half measures in defence so long as war existed, and to do this we must have recourse to the chemists. The chemist, according to Professor H. E. Armstrong, must be a person trained to reason, doubting all things, ready at all times to discuss; he must have a wide vision and a fertile imagination guided and controlled by his reason and by the results of experience. He must be apt at experiments and ready to interpret their meaning and to add to the stock of human knowledge by the results he gets from them. Such men were needed in industry, and if the Society of Chemical Industry and the chemical industry and the work of professional chemists were to flourish, such men must be forthcoming, and they would be forthcoming so long as the ideas set forth in the Exhibition at Wembley inspired the work of those concerned with the chemical industry and the profession of chemistry.

Science and Commerce Well Mixed

Mr. D. Milne Watson said it was a great privilege to him to reply to a toast so eloquently proposed by Sir Richard Glazebrook, who among his many honours was the Chief Gas Examiner, a position of very great importance to all consumers of gas and more particularly to himself as Governor of the Gas Light and Coke Co. The conjunction of science and industry exemplified in the dinner showed the progress that had been made in the last few years in bringing scientific chemists and industrialists together. One of Mr. Woolcock's ambitions was that they should get to know each other better. Mr. Woolcock had been called the human catalyst, one of his many functions being to see that science and commerce are well mixed together. (Laughter.) Seriously, he believed the work of the Society of Chemical Industry was of great importance. They had not forgotten that in 1916 the Association of British Chemical Manufacturers, of which he had the honour at present of being Chairman, was founded jointly by the then President of the Society of Chemical Industry (Dr. Charles Carpenter), together with the President of the Chemical Society (Mr. Alexander Scott) and the President of the Society of Dyers and Colourists (Dr. Reé). Industry to-day was faced with very serious problems all over the world as a result of the war. There had been a very great extension of chemical plants, but in the impoverished state of the world now it would take many years to get the work of all these plants absorbed and to correlate them and put them in their proper place.

Professor G. G. Henderson, also replying to the toast, said it might be regarded as significant that the "Profession of Chemistry" should have found a place in the toast list. Many of them remembered a time not many years ago when it would

have been ludicrous to have talked of the profession of chemistry. The position now was entirely different, and this great change could be attributed to at least three factors. One of the more recent factors was the great war. The second factor was, he believed, that wonderful display in the chemical exhibit at Wembley, and he was pleased to have the opportunity publicly of stating that they owed that marvellous display to one man, their Chairman that evening. The third and more remote factor which had contributed so greatly to the improvement of the chemical profession was, he asserted without fear of contradiction, the quiet study and continuous work of the Institute of Chemistry carried on for the last half century. The next step was that they must speak with one voice as a united profession, and that could only be realised by having some central organisation with central headquarters. Another step was equally obvious. It was always difficult to realise how profound was the ignorance of the majority of the general public as to the part played by chemists in the common life, and it was necessary to make the general public realise how important was this part. What had to be done was to make greater use of the daily press, which was always ready to receive reliable information. That had been done in a certain part of the country which he would not mention, and he therefore urged the industry to make use of that great educational agency, the daily press.

The Society of Chemical Industry

Mr. A. Chaston Chapman, F.R.S. (President of the Chemical Industry Club), who proposed "The Society of Chemical Industry," said that when he was recently elected President of the Chemical Industry Club, he did not think that one of his first official duties would be to propose the health and prosperity of the Society of Chemical Industry. A great deal had been heard about slogans, and as most politicians had their pet slogans, why should chemistry be behind the times? Therefore he suggested as a motto for chemistry the three words, "Understanding and Co-operation." The war had done a great deal to increase the understanding among all branches of chemical science—teachers, students, research workers, industrial chemists and manufacturers—whilst the Wembley exhibit, thanks to the energy, enthusiasm and great organising capacity of their Chairman, had considerably increased the general knowledge of what this country owed to its chemists.

Mr. W. J. U. Woolcock (President of the Society of Chemical Industry), replying to the toast, said the Society of Chemical Industry was flourishing, but he would remind them that it was unique in regard to material things inasmuch as it had very little to offer to its members. They joined the Society for the ideal which the Society had in front of it. They knew that the Society stood midway between science and industry. They knew that, as far as industry was concerned, there was no industry that could not be improved by a better appreciation of science and by a bigger influx into the works of the chemists. He was delighted that Professor Henderson had got so near and yet did not mention Chemistry House by name. He knew that that great project had Professor Henderson's fullest sympathy, and he could speak with certainty to the same effect for the President of the Chemical Society, and also as far as Mr. Chaston Chapman was concerned. They were not going to hurry the matter, but he assured them that if there was less talk about Chemistry House at the moment there was more real thought and more co-ordination of ideas and a greater attempt to crystallise ideas at the present moment than had ever existed before. The past year had shown in a remarkable way the degree of co-operation among learned bodies, and, better still, among individual sciences. Never again could it be asserted that there was any difficulty whatever in getting scientists to work together. It was untrue. It was the easiest possible thing in the world!

The Chemical Industry Club

Mr. C. S. Garland, proposing "The Chemical Industry Club," said it was with the greatest pleasure that he coupled with the toast the name of Mr. Coley, because it was to Mr. Coley that the genesis of the Club belonged. He had worked extremely hard to bring the Club into being because at that time the idea that chemists could fraternise together was appalling. (Laughter.) However, the Chemical Industry Club had shown what chemists could do in this matter.

Mr. H. E. Coley, replying to the toast, referred to the progress of the Club and claimed that it had justified its existence.

The Guests

The final toast, that of "The Guests," was proposed by Mr. W. Cullen, who regretted the absence of Sir Arthur Duckham, who, he said, would probably have told them what a chemical engineer was, but he coupled with the toast the name of Mr. Percy Ashley, of the Board of Trade, who he hoped would say what a fine chemical was because nobody yet knew. (Laughter.)

Mr. Percy Ashley, speaking from the point of view of the section of the Department of the Board of Trade for which he at the moment is responsible, supported what Professor Henderson had said that chemical industry must speak to the politicians with one voice. Nothing was more important to the country than that its industries should be so organised that they could speak authoritatively to the Government and to Government Departments, and give a clear indication of what industry thinks to be its requirements and as to the manner in which the State might help it. The Government and its Departments wanted to be helpful to industry, and it was up to industry to indicate clearly, definitely and unanimously the lines upon which that help could be given. One reason, perhaps, why the public did not fully appreciate the work of the chemist was the extreme modesty of the chemist, and, he was afraid he must say, the amazing terminology of the science. With regard to Wembley, he could well imagine that in half a century to come some memorial would be placed on the site of that little and characteristically comfortable room in which Mr. Woolcock had organised that wonderful chemical exhibit.

Artificial Silk Enterprise

THE Bradford Dyers' Association is taking a hand in the future development of artificial silk, and has decided further to extend their American artificial silk dyeing and finishing works. Mr. H. R. Armitage, one of the directors, is at present in the United States completing the necessary arrangements.

"We believe so strongly in the future of artificial silk," said Mr. Armitage, on arriving in New York, "that we are putting $1,000,000 into the new unit of our present organisation at Bradford, Rhode Island." The extension will be ready in about nine months' time, and will concentrate on the dyeing and finishing of materials containing artificial silk. The Bradford Dyers' Association has two plants running exclusively on artificial silk mixtures in Great Britain.

Mr. Armitage said that great improvements had been made in the production of artificial silk goods. Viscose could now be dyed in fadeless colours, like cotton, while there was no method of dyeing animal fibres, such as real silk, absolutely fast to washing and sunlight. He believed that artificial silk offered less competition to silk than cotton.

The hosiery and knitting trades were bound to remain the biggest consumers of artificial silk, Mr. Armitage believes, but large quantities were used in cotton goods, India takes a bigger weight of artificial silk piece goods than any other country.

The Hele-Shaw Stream-Line Filter

AT the meeting of the Oil and Colour Chemists' Association, to be held in London on January 8, 1925, exhibitions of the Premier Mill, the Hele-Shaw Filter, and Malay Gums are to be given. In connection with the Hele-Shaw Filter, Mr. Pickard, of the Stream-Line Filter Co., Ltd., 64, Victoria Street, London, S.W.1, is anxious to obtain materials which are in use by members of the oil and colour industry, and which are more or less in need of filtration, and he has asked members of the Association to send him samples of such materials, so that they may be put through the filter and reported on at the meeting in January.

Removing Old Chemical Plant

THE November number of *Oxy-Acetylene Tips*, a journal issued by the Linde Air Products Co., of New York, contains a number of illustrated articles describing the use of oxy-acetylene. One of the most important of these is in the quick removal of old iron and steel work, where the job can be more quickly and quietly done by oxyacetylene than by any other method. One of the articles referred to suggests that old chemical plant can be most economically scrapped by this means.

The Development of Rubber Latex

Chemists' and Rubber Technologists' Combined Meeting

DR. A. VAN ROSSEM (Director of the Government Rubber Laboratories at Delft, Holland) read a paper on "Latex, its Chemistry and the Development of its Industrial Applications," at a joint meeting of the London Sections of the Society of Chemical Industry and the Institution of the Rubber Industry, held at the Engineers' Club, Coventry Street, London, on Monday, November 17. Dr. Bernard Dyer, chairman of the London Section of the Society of Chemical Industry, presided.

The author emphasised that until a few years ago rubber latex was practically unknown in Europe and North America, the latex, after exudation from the tree, having been transferred into crude rubber, either by coagulation on the plantations in Eastern Asia or by the smoke process in Brazil, and this raw material was transported to the manufacturers. During the last few years, however, considerable quantities of latex had been shipped in a preserved state to U.S.A. and Europe. The difficulties of transport of the latex had often been raised, and Thomas Hancock himself, who had experimented with it and had given up its use for industrial purposes, had given as one of his objections the necessity for transporting so much worthless material with it. However, chemistry had enabled latex to be concentrated, so that the costs would be no longer a serious objection to its use. The recent revival in the industrial applications of latex would not be a passing one. Over 6,000 tons of latex were shipped in 1923.

Whatever the industrial merits of latex, the author felt sure that their mere possibility had a stimulating influence on latex research, with beneficial results for the scientific problems of the rubber industry in general.

The Character of Latex

As to the microscopical examination of latex, the author said that the study of this product had gradually become of a physico-chemical character, and afforded another example of the conception that the border lines between physics and chemistry, also in applied science, were gradually being effaced. It was from this point of view that the paper dealt a good deal with the physical properties of latex, and the chemical composition was only considered in so far as it stood in narrow relation to the physico-chemical conduct of latex.

Latex consisted, as microscopical examination, after dilution, showed, of rubber particles suspended in a serum, and being in active Brownian movement. In a review of the work of various investigators, the author said that, according to Dr. Hauser, these particles were surrounded by an adsorbed layer of non-caoutchouc substance, and consisted of two different rubber phases, one outer layer, which was hardly soluble in benzol and of very high viscosity, and an inside fluid phase of low viscosity and soluble in benzole. By absorbing benzol the particles swelled and, on being pricked, burst, while the benzol solution of the fluid inner phase came out. There was no doubt, said the author, that Hauser's discovery would have a great influence on our conception of various phenomena of crude and vulcanised rubber and processes in the rubber industry, such, for instance, as the phenomenon of "freezing" of raw rubber; the masticating process; the calender effect of rubber; the vulcanisation process; and the fact that when a piece of crude rubber was stretched it contracted at normal temperature, but did not after being cooled.

Having referred briefly to some of the work done by various investigators with regard to the coagulation process, the author discussed the industrial applications of latex in the rubber industry. Its use in the industry, he said, might be classified according to the following scheme:—(*a*) spraying of latex mixed with sulphur and compounding ingredients; (*b*) impregnation of fabric and cord; (*c*) spreading purposes; (*d*) dipping processes; (*e*) vulcanised latex; (*f*) other purposes. For various reasons, he was not convinced that the mixing of compounding ingredients in latex with subsequent spraying would afford a mix of equal homogeneous division of compounding ingredients as was obtained by the ordinary mixing process on the mixing rolls. The impregnation of fabric and cord seemed an essential application for the use of latex. Ammoniated latex had a very low viscosity, which must be a considerable advantage in the impregnation of fabric and cord. It was doubtful if the necessary doughs could be obtained for spreading processes by adding compounding ingredients. Concentration of latex would also be necessary to obtain the doughs. Another way of obtaining pasty masses was given by Loomis and Stumpf, by coagulating ammoniated latex with alum.

There were various ways of concentrating latex, such as evaporating, centrifuging, creaming naturally, or with chemical means and concentration with protective colloids. Concentration was of great importance from the point of view of reducing transport costs.

In conclusion, the author said it was unlikely that the direct application of a remarkable substance such as latex would disappear. Closer study was necessary and colloid chemistry would play an important part.

Discussion on the Paper

Mr. B. D. Porritt (Director, Research Association of British Rubber Tyre Manufacturers), opening the discussion said he did not think the time had come when it was possible to predict what influence the various proposals for the use of latex would have on current factory practice, or to what extent they would broaden the already wide field covered by the rubber industry. Although there were many possibilities, many practical difficulties had to be overcome before the use of latex was likely, in any measure, to supplant the general methods employed in the manufacture of rubber. It had to be seen whether a film of vulcanised latex possessed the same properties as that prepared from ordinary masticated rubber, and it would seem probable that the two would be found to be structurally different. The prominent part played by the calender and tubing machine in the mass production of rubber goods could not be overlooked, and the main possibilities of the use of latex, as indicated by the author, would seem to be restricted to processes which were at present carried out with rubber solution. With regard to the use of latex for the spreading and dipping processes, there was one fundamental difficulty which might have to be overcome, namely, the securing of satisfactory adhesion between the successive layers of deposited rubber. The most interesting application of latex from the point of view of the manufacturer, at the moment, seemed to be in connection with its use as a means of introducing compounding ingredients into rubber, either in conjunction with a spraying plant or by a subsequent coagulation process.

Dr. P. Schidrowitz said that, although, in transporting latex, we had to transport two tons of water to one ton of rubber, this fact had not militated against the application of latex to the extent that it might have done. However, if latex could be concentrated successfully it would be a great advantage. Within a measureable period, he believed, the transport of concentrated latex was likely to be a success. He appealed to the members of the Society of Chemical Industry, and particularly the engineering section, to study the question of containers, not only for ordinary latex, but for the concentrated material, as and when it came along.

Rubber Latex for Paper Making

Mr. Frederick Kaye referred to his experience with latices from trees in various parts of the world, and discussed the application of latex to paper and board making. It was not the general experience that rubber in latex papers deteriorated, though that might be so in some cases. There had been a good deal of investigation into the deterioration of papers before latex was thought of in this connection.

Dr. van Rossem, in reply to Mr. Porritt, said his experiments in connection with the dipping process did not point to any trouble being experienced as to the unsatisfactory adhesion of the layers. He had no experience of the spreading process, it did not follow, however, that because layers of Para rubber did not adhere properly, layers of latex would not. He did not regard the problem of producing proper containers for the transportation of latex as one which offered very great difficulty in the future. He foreshadowed the transportation of latex in the form of a pasty material in cardboard boxes, or in dry form, to be transformed back into latex for use on arrival.

Methods of Controlling Varnish Tests

War Department Chemist's Experiments

A NUMBER of tests carried out in the department of the War Department Chemist, Woolwich Arsenal, the object of which was to arrive at methods of controlling the conditions in the examination of varnishes, were discussed by Mr. J. A. Frome Wilkinson, B.Sc., F.I.C., and Mr. E. F. Figg, A.I.C., in a paper before the Oil and Colour Chemists' Association in London on Thursday, November 13. The authors examined factors which affected the results of physical tests on varnishes.

Control of Conditions of Drying

The problem of the preparation of a varnish film for testing was dealt with first. The following factors, it was stated, affected the rate of drying, and hence the state of oxidation and colloidal condition, of the varnish film :—(*a*) thickness of film ; (*b*) rate of renewal of air at the surface ; (*c*) temperature ; (*d*) humidity of the air ; and (*e*) intensity of wave length of light. In the preparation of films, provision must be made for securing that each of these factors was controlled and measured.

It was found possible to obtain films of the required thickness on small aluminium plates (10 by 5 cms.), by careful brushing, provided the varnish used flowed out well. The plate was cleaned with ether and weighed in a small beaker. One side was evenly coated with varnish, by cross-brushing, and re-weighed ; the other side was then treated in the same way, and the whole re-weighed. The rate at which air passed across the surface of the varnish film affected both the rate at which volatile matter was removed and the rate of oxidation, and this factor, together with the temperature, was controlled by apparatus evolved by the investigators. The degree of humidity of air being constant for a given drying temperature, the effect of alterations in this factor was not investigated. With regard to the intensity of light, owing to the variation in the intensity and spectral composition of daylight, and the difficulty of devising a standard artificial daylight, the films were dried in darkness. Though this introduced somewhat artificial conditions, it was thought to be less objectionable than the use of light sources whose spectral characteristics differed from those of sunlight. Moreover, the absence of light only retarded the drying process, and probably did not alter its general character.

Water Absorption

The capacity of the film to absorb water was discussed in the second part of the paper. It followed, from a conclusion arrived at by Morrell, that any factor which influenced drying would also affect the water absorption. In addition to the factors affecting the rate of drying, already given, there had also to be considered (*f*) age of film ; (*g*) temperature of water during absorption ; (*h*) effect of small amounts of impurities in the water.

The composition of the varnishes used were as follows :—

		Parts by weight
MADE IN LABORATORY.		
Manila varnish	Manila copal, hard	25·0
Pb=0·019%	Raw linseed oil ...	25·0
Cu=0·015%	Turpentine	31·2
Mn=0·004%	White spirit	18·8
		100·0
COMMERCIAL SAMPLES.		
Tung oil varnish	Rosin.....	11·3
PbO=1·2%	Tung oil	37·5
MnO=0·02%	White spirit	50·0
		98·8
Stand oil copal varnish....	Fused Congo copal	14·0
Cobalt rosinate=2%....	Stand oil	44·0
	Turpentine	40·0
		98·0

As to the experimental results, the effect of the rate of renewal of air at the surface during drying was found to have little effect, and, provided an adequate supply of air was available, the rate of drying, and hence the proportion of water absorbed, was unaffected, other conditions being the same.

From the results of tests on the effect of thickness of film, it was concluded that the thickness might have a very large effect on the proportion of water absorbed by the film, and the nature and extent of this effect would depend on the conditions of drying. Films just dry absorbed nearly equal quantities of water per unit area in a given time, independently of their thickness. Films dried for a considerable time at a comparatively high temperature would absorb approximately equal quantities of water per unit weight in a given time, whatever the thickness of the film within limits. Both manila and tung oil varnishes behaved in the same way.

As to the effect of temperature of drying, results obtained on manila varnish by varying the temperature of drying showed that, after drying at 25 and 40 deg. respectively, the proportion of water absorbed, in a given time, decreased quite appreciably at the higher temperature of drying. A similar conclusion was reached if the increases in weight per unit area were calculated.

The results obtained on manila varnish, by varying the length of time of drying, seemed to indicate that, for the same weight of film, at either 25 or 40 deg., the absorption was slightly higher for the longer drying periods than for the shorter. This effect required further investigation, however, since, at first sight, it appeared to be at variance with the results of others. The periods in this case varied from 2 to 14 days.

As to the effect of temperature of absorption, results obtained by raising the temperature of the absorption bath from 25 to 40 deg., on manila and tung oil varnish, showed that the rise of 15 deg. had, in most cases, about doubled the figure for absorption.

With regard to the change in volume on absorption, it was concluded that the films swelled during absorption by an amount equal to the volume of the water absorbed. It did not follow that this would be true of all varnish films, and a study of the volume changes for various types of varnish might produce interesting results.

The authors considered that the results so far obtained showed that the technique evolved for drying and absorption was capable of yielding results for which a reasonable degree of accuracy might be claimed. The effect on the results of various conditions of drying and absorption required further investigation, using longer periods of drying, more widely differing temperatures, and, most important of all, a greater variety of oils, varnishes, and dopes. A further study of the effects of thickness of film would also be of interest.

Discussion

THE PRESIDENT (Dr. H. H. Morgan) viewed the paper as a first report of a very lengthy investigation. The drying of varnishes in the dark might be a weak point, though not necessarily from the point of view of this investigation. The results were not comparable with previous results presented to the Association, because the times of drying and the temperatures were quite different. Another reason why these results were not comparable with others was that some very short-oil varnishes were used. The final hardened condition was reached in a shorter time in a short-oil than in a long-oil varnish.

DR. RUDOLPH, in a letter, said the authors' water absorptions for tung oil varnish were higher than he usually obtained.

DR. MORRELL, also in a letter, expressed the opinion that there was a spreading of water between the film and the metal below it which reduced adhesion, and would influence the water absorption in the case of thin films.

MR. G. H. PERRY (War Department Chemist) said the object of the work was to determine rapid methods for arriving at the durability of a paint or varnish under Service conditions, and agreed that it was very incomplete yet.

DR. SMYTHE agreed that some of the varnishes were abnormal, and asked if the authors had examined nitro-cellulose dopes from the point of view of absorption ? His experience was that they were highly permeable.

MR. C. A. KLEIN, speaking of the temperature of drying, said his experience with films of this kind was that if they dried

a film at 100 deg. it was practically water-free, but if it were left in the air for some time it took up a definite quantity of water. Was a varnish with a low water absorption always durable?

MR. J. T. ANDERSON asked if the effects of gases in the water absorbed had been investigated. Also, as films were used to cover plates, had the authors any knowledge of the state of the plates after they had been covered?

MR. A. DE WAELE, dealing with water absorption, said the authors had confirmed a result he himself had obtained as to the higher water absorption of tung oil varnishes.

Author's Reply

MR. WILKINSON, in reply, agreed that drying in the dark must have retarded the process; no doubt it would have been accelerated had there been anything like a light of the intensity and composition of ordinary daylight. The temperature of 25 deg. for the drying and water absorption tests was adopted for convenience, and was not so much higher than the normal that it would produce a great deal of difference in the results. The temperature of 40 deg. was used merely to obtain some idea of the effects of higher temperature. It was necesasry to carry out further tests at about 15 deg. He did not think the temperature of absorption really mattered much so long as it was constant. Apparently, within limits, it would simply alter the amount of water absorbed, and, whether the temperature was 40, 25 or 12, the character of the results would be the same. But it was most important that the temperature should be controlled, as in some varnishes differences in temperature made very considerable differences in the amount of water absorbed.

With regard to the use of short-oil varnishes, one of the difficulties had been to obtain varnishes of known composition, and they had chosen a manila varnish which had been made in the laboratory and of which they had a fair quantity. He had been surprised that the water absorption of tung oil varnish was so high, although he had expected the stand oil to be fairly low. The Department had collaborated with Dr. Morrell and others in some experiments on dopes, and Dr. Smythe's statement that dopes were very permeable was borne out by the results. Those results concerned low nitrocellulose dopes. As to the length of time a film would absorb water, the longest period he knew of was 122 days, and the film was still absorbing. Whether it would reach finality or not he did not know, but it was an extraordinary state of affairs. Low absorption did not always mean durability; it was only one factor, and possibly not as important as elasticity. He should say that gases dissolved in the water had a slight effect, judging from Dr. Morrell's work, which showed that the amount of water absorbed depended on the hydrogen ion concentration. The destruction, in a fortnight, of a varnish of low water absorption might easily happen; water absorption in itself was useless as a guide to durability, and must be taken in conjunction with elasticity and other factors.

THE PRESIDENT said he had found his previous idea, that the increase in the water absorption of a film, as carried out by Morrell's method, was due to water accumulating between the film and the plate on which it was supported, to be wrong. Tests on the water absorptions of films not attached to plates showed that the films still absorbed water after three months. His method was to get a varnish film in the form of a disc, on a wire, about 3 inches in diameter. A horizontal surface was obtained by the use of mercury.

Deodorising Fish Oils

NUMEROUS attempts have been made to improve the odour of fish oils. In the United States it has been found by Professor H. K. Benson, the head of the chemical engineering department at the University of Washington, that heating of salmon oil in an inert atmosphere has very good results. As a rule the iodine value was reduced, along with the disappearance of the odour, and there was a darkening in colour. The results have been given in some detail by *Chemical and Metallurgical Engineering* (October 20, 1924), which shows that nitrogen, carbon dioxide and hydrogen have been the gases used. The results were fairly alike, so that apparently when hydrogen was used the temperature was not high enough for hydrogenation to take place.

Dr. E. F. Armstrong at Toronto

Address to Chemical Industry Society

SPEAKING at the opening meeting of the Toronto Section of the Society of Chemical Industry, Dr. E. F. Armstrong pointed out that the Society of Chemical Industry was unique in its international and widespread activities. This was proper, as chemistry to him was, if not always international, at least imperial, and unity in Chemical Society work was most desirable.

The public saw the change that the mechanical sciences had made, but, to a lesser degree, appreciated the fundamental place of chemistry within these movements. Something had been done, as a start in the matter of bringing chemistry home to the public; but the daily Press was still swayed by the sensational only. Chemists themselves might take more pains in presenting the results of their work. Even at chemical meetings one chemist was lost when listening to another, and a plea was made for "plain English," as a language to be used even among chemists.

Team Work in Research

As a comment on the activities of the academical chemist, Dr. Armstrong suggested that there was a vast amount of rather second-class work being pushed into the literature by individuals who felt that this was the only way to make a showing. The older idea of not printing small parts of research work separately was recommended. If there was more team-work in research it would be possible to put out results that really dealt with some major section of a problem. In such work, the University of Toronto was well-placed to show leadership. The modern trend of chemistry lay in the development of our conception of structure. From analysts making qualitative tests, chemists had developed the art of quantitative estimations. This was followed by a study of constitutions. Then the laws of physical chemistry were developed. An era of synthetic chemistry arrived, and this, in turn, was followed by work on physical measurements. More recently, tools for the study of structure were available, and they had the X-ray, and the present knowledge and theory of nuclear structure available.

The organic chemist laid the basis for this study of structure. Van't Hoff and Pasteur gave us conceptions of the carbon atom, which permitted Langmuir, for example, to conceive the action of a spreading layer. The attack on matter had spread to more difficult fields. The development of protein chemistry was an example. The chemistry of the sugars was a wonderful achievement. All this led up to the present-day colloid chemistry. Nature might have used many combinations of a few simple compounds, but apparently, while there was a great diversity, a minimum of fundamental arrangements was continued.

Industrial research had, in the main, to deal with a process which was a special case of a certain general theory. This was why the research chemist, at first, could not understand many processes which appeared to be working contrary to all theory. Eventually, the theoretical man was correct, but he must know his process well to prove it. One of the most important matters was the effect of small quantities of other substances on the reactions. This had come to be known as catalysis, and practically all such reactions were at surfaces which were either visibly solid, or were boundaries of large molecular aggregates. Success in all catalytic reactions depended upon having these surfaces clean and active. In industry, the surface might be only as clean as was necessary. The introduction of a variety of words, which, in themselves, lacked, or were impossible of, clear definition, did not aid in explaining what happened. Surfaces might become dirty by (1) contamination with gummy matter; (2) by chemical poisons, which might be gases, metals or salts; (3) by heat, which caused a running-together much below a temperature where this was sometimes expected.

In explaining a typical catalytic reaction, such as hydrogenation at a nickel surface, it was necessary to recognise momentary affinities which, if they did not form compounds, as Professor Bancroft held, did so after a very brief interval of time, and were diffused away from the surface. Experimental evidence showed that substances might be dehydrogenated. This indicated reactions which might be disturbed in one of two ways, according to conditions, and, if there were two ways possible, probably both reactions would go on.

Following the War, Dr. Armstrong said, new forces were at work. Canada must take up her share of empire problems in science, as in other ways, and every encouragement should be given to that end.

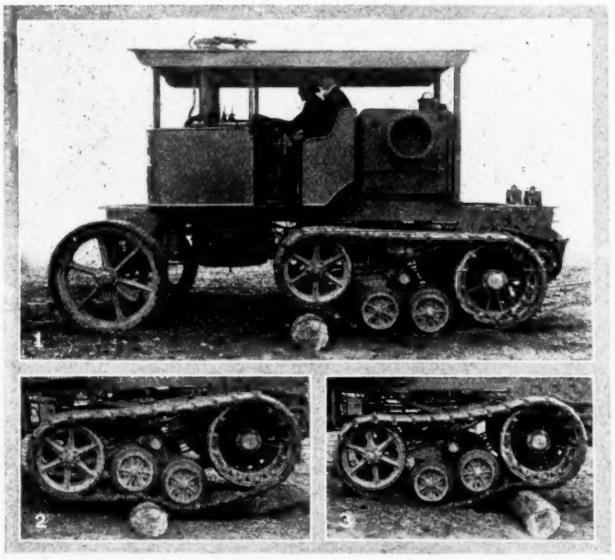
In the discussion which followed, Mr. Schorman pointed out the necessity for sustained effort to complete research work, and the difficulty facing smaller organisations in Canada, in undertaking original industrial work. Dr. Lash Miller regretted that Dr. Armstrong's father was not able to visit Canada with the British Association. If it were possible to have more frequent personal contact with such leaders, it would be of the greatest assistance to the work of various departments of chemistry in the University. In many of the fields of research mentioned by the speaker, the University of Toronto had made contributions, either directly or through former pupils. He referred particularly to the recent work of Professor Wasteneys, who had succeeded in reversing reactions involved in protein hydrolysis.

Mr. Thomas Roden, one of the early founders of the Society in Canada, said that, as yet, the Dominion Government had not made any really large effort to assist general progress in industrial research matters.

The "Sentinel-Roadless" Tractor

Successful Demonstration at the Works

THE demonstration at the Sentinel Waggon Works at Shrewsbury on Wednesday, of the qualities of the new "Sentinel-Roadless" tractor, which the company have just designed, proved an interesting example of the advances made in the application of the caterpillar or chain track principle to tractor work on heavy ground. This tractor, as Mr. Price-Jones,



PHOTOGRAPHS OF THE TRACTOR IN ACTION, SHOWING THE FLEXIBILITY OF THE CHAIN TRACK IN TRAVELLING OVER OBSTACLES OR OVER ROUGH GROUND.

the general manager, explained in a short address at luncheon represents a combined effort on the part of Roadless Traction, Ltd., Hounslow, and the Sentinel Company. Of the "Super-Sentinel" waggon, which was put on the market in May of last year, nearly 700 have already been delivered to customers. In the production of this type, the power unit and the boiler were completely redesigned, and in designing the new roadless tractor a wider application is aimed at of the advantages of the 1923 type.

The tests to which the "Sentinel-Roadless" (of which the photographs give some idea) was subjected were both severe and convincing. On a large space of ground in the works, in which were miniature pools, bogs, and ditches, rendered more than usually difficult by the recent rain, the tractor moved about with comparative ease, dipping down a sharp slope, rising up a steep incline, ploughing its way through water, and climbing over logs of trees without any difficulty or excessive strain. On this rough ground it easily pulled a tree weighing three tons, and on the roadway, where it works very quietly, it drew a train of old wagons of over 50 tons.

The comparative ease with which the "Sentinel-Roadless" met these severe tests is due not merely to sound construction, but to the fact that the weight is mainly concentrated over the weight-carrying bogeys of the chain track, the front wheels, of the ordinary type, having just sufficient adhesion to steer the vehicle. The result was that, when the tractor was dipping into a hollow, the front wheels never dug themselves in, and when rising sharply up always maintained sufficient touch with the ground for efficient steering. Another notable advantage was made clear in the course of the demonstration. When moving in a circle on very soft ground, the soil was never forced up on the outer edge, as is generally the case. The weight appeared always to be evenly distributed, and in taking curves on very rough ground the tractor left a uniformly level impression.

The advantages of the "Sentinel-Roadless" may be summed up as a combination of great strength with an unusual degree of flexibility. This capacity to function efficiently in all sorts of conditions makes it especially suitable for heavy and rough colonial work, but there are also many special uses of which it is capable at home—for example, in agriculture, timber haulage, etc.

India Needs Coal Tar Dyes

THE American consul in Bombay reports that India is dependent upon outside sources for its coal tar dye requirements, there being none manufactured in the country and no prospects of such a development. While a certain quantity of dyes is imported through all the Indian ports, Bombay holds a commanding position in the trade, and most of the alizarine and aniline dyes used in the country are received through this port, and hence distributed to all parts of India. Further, the importance of Bombay as a dye centre is greatly enhanced by reason of the concentration of a large number of cotton mills in the Presidency.

Cotton dyes constitute the majority of those imported; reds prevail. Alizarine paste (20 and 40 per cent.) for Turkey red heads the list of all the dyes imported, and is followed by direct cotton red and sulphur black, in about equal proportions. The imports of either of the latter two probably exceed in quantity those of all other direct and sulphur dyes. Other classes of dyes are imported in much smaller quantities. Basic dyes are used for topping direct dyes for colouring silk, wool, jute and coir. The somewhat increased use of silk has had an effect on the imports of basic dyes. Acid dyes are employed principally for wool, paper, and the making of red powders for ceremonial purposes. Vat dyes, except indigo, are used chiefly for yarn dyeing, for strips in fast-to-bleach shirtings. Indigo is largely used, but the local natural product still holds the market. Chrome dyes are little in demand.

The dye market is naturally dependent on the market for textiles, and since the high prices of raw cotton have restricted the sale of textiles, dyes have been adversely affected.

American Loan for the I. G.

IT is stated in the German press that the I. G. has succeeded in negotiating a loan in the United States for $2,500,000. The reduction of the tariff rates on dyes is understood to have had a bearing on the willingness of American bankers to advance the money. Since the amount of this loan is entirely inadequate to meet the credit requirements of all members of the I. G., it is thought that it is the forerunner of other American credits, says *Chemical and Metallurgical Engineering*. An investigation on the part of American interests looking to the purchase of intermediates in the Ruhr is thought to have developed the impracticability of such a plan. That the German chemical industry is gathering momentum is revealed by the publication of employment figures which show that German chemical industries in 1922 had 51·77 per cent. more full-time employees than was the case in 1913. This shows a steady advancement in employment since 1920. Comparable figures are not available for 1923 and 1924, but these years were abnormal due to the occupation of the Ruhr.

From Week to Week

THE AWARD OF THE NOBEL PRIZE for Physics and Chemistry has been held over until 1925.

MR. WALTER BALSHAW, of Blackpool, for 27 years engineer with the United Alkali Co., at Fleetwood, has died at the age of 47 years.

THE AMERICAN FERTILISER INDUSTRY during September increased the number of employees by no less than 37 per cent. owing to seasonal activities.

SIR WILLIAM ALEXANDER, chairman of the British Dyestuffs Corporation, is visiting the United States this month. He is president of the American-British Chemical Supplies, Inc., of New York.

THE FOLLOWING have been elected to Corporate Membership of the Institute of Physics:—*Fellows:* Messrs. L. F. Bates, J. H. Field, and H. G. Hughes; *Associates:* Messrs. D. Gunnaiya and A. Subrahmaniam.

MR. J. W. SAVILLE, who has been employed on the commercial staff of Brotherton and Co., Ltd., ammonia and tar distillers, of Leeds, for more than 40 years, has been appointed a Justice of the Peace for Wakefield.

EXPERIMENTING WITH A MIXTURE of sulphur and chloride of potassium to make "a big bang," Mr. Joseph E. Simpson, engineer, of Preston, was killed by the explosion caused when he allowed a brick to fall on the canister containing the mixture.

IMPORTS OF COAL-TAR DYES through the port of New York during September totalled 152,743 lb., or more than double the figures for the previous month. The decreased import duties have resulted in a considerable increase in figures at many U.S. ports.

AT MANCHESTER UNIVERSITY the following have been elected to Honorary Research Fellowships for the year 1924-25:—Elizabeth Stuart Gatewood, Ph.D. (Columbia), in chemistry; Walter Gordon, Ph.D. (Berlin), in physics; Gertrude Robinson, M.Sc. (Manchester), in chemistry.

THE *Journal of the Franklin Institute* of Pennsylvania for November contains a number of papers presented at the Centenary of this institution which was celebrated last September. These include an excellent paper by Sir William Bragg on "The Carbon Atom in Crystalline Structure."

A SEARCHLIGHT has been converted into a fog beacon to guide aircraft at Croydon Aerodrome. The light is provided by an oxy-acetylene jet lying on an endless chain, which is drawn through a bath containing strontium and then through the jet, giving a reddish glow capable of penetrating mist and fog.

THE QUARTERLY REPORT of the South African Alkali, Ltd., states that in view of the fact that a Customs duty and a dumping duty have now been imposed on imported soda, steps are being taken to prepare for the resumption of active operations at the works at an early date. A scheme of reconstruction, sanctioned by the Government, will be placed before shareholders.

TO DETERMINE THE EFFECTS OF THE FUMES of gasoline containing ethyl gas, tests have been carried out by chemists of the American Bureau of Mines for the last eight months. More than 100 types of animals have been exposed to the fumes during the entire duration of the test and no apparent effects have been noticed. Lead inhaled by the animals was found to be immediately exhaled again, and an analysis of the intestines of the subjects revealed absolutely no trace of lead.

APPLICATIONS FOR GRANTS from the Chemical Society Research Fund must be received by the assistant secretary not later than December 1. The Selection Committee of the Harrison Memorial Prize will meet shortly to consider the award of the prize, valued at about £150. The award will be made to the chemist of either sex, natural British born and not more than thirty years of age who, in the opinion of the committee, has during the previous five years conducted the most meritorious and promising original investigations in any branch of pure or applied chemistry and published the results. Applications must reach the President of the Chemical Society, Burlington House, Piccadilly, W.1, not later than December 1.

A FOURTH BEET SUGAR factory is to be built at Kidderminster at a cost of £310,000.

DR. W. E. S. TURNER, of the Department of Glass Technology, Sheffield University, has returned from America.

ALDERMAN J. W. STEVENS, elected mayor of Queenborough, is managing director of the Sheppey Glue and Chemical Works Co., Ltd.

PLANT FROM GRETNA ETHER FACTORY is still on the market. Catalogues may be had from J. W. Ellis and Co., 9, Ellison Place, Newcastle-on-Tyne.

PROFESSOR E. C. C. BALY, Professor of Chemistry at Liverpool University, was given an enthusiastic welcome by undergraduates and was driven round Liverpool on his return from America on Monday.

DISEASES OF OCCUPATIONS for October, recorded in the *Ministry of Labour Gazette*, include cases of mercury poisoning, (1); arsenic poisoning, (3); epitheliomatous ulceration, (18); and two cases of chrome ulceration.

TANKS & DRUMS, LTD., of Bowling Iron Works, Bradford, makers of tanks, cylinders, drums, kegs, etc., are extending their works to meet an increasing business. The firm was formerly known as the Shipley Tank Co.

PROFESSOR RALPH H. MCKEE, of the department of chemical engineering, Columbia University, left America on November 1 for Italy, Poland and France, combining a business and holiday trip. He will return in the latter part of December.

MR. E. G. GAUL, M.Sc., at present lecturer in bacteriological chemistry at Manchester University, has been appointed an adviser in agricultural chemistry with the status of senior lecturer under the scheme established by the Ministry of Agriculture and Fisheries.

DR. A. T. LARSON and Dr. R. L. Dodge have left the Fixed Nitrogen Research Laboratory, Washington, to take up work with the du Pont company. Dr. Larson will be remembered for his papers on synthetic ammonia and he will undertake a similar line of work in his new connection.

THE NUMBER OF UNEMPLOYED INSURED WORKERS in the chemical manufacturing industry on October 27 totalled 8,739—7,352 men and 1,387 women. These figures, which represent approximately 10 per cent. and 6 per cent. of the workers respectively, are a slight decrease in both instances over the figures for the previous month.

THE PRESENTATION TO LEEDS UNIVERSITY of the portrait of Professor Arthur Smithells by Mr. Fiddes Watt, R.A., will take place in the Great Hall of the University on November 25. Both Professor Smithells and Mr. Fiddes Watt will be present. With the balance of the £2,462 subscribed, a scholarship amounting to £100 per annum, bearing Professor Smithell's name and founded upon his advice, will be established.

THE REPORT OF THE OFFICIAL INQUIRY, under the Boiler Explosions Act, into the explosion of an oil still at the works of Major and Co., Ltd., Sculcoates, Hull, is now published by H.M. Stationery Office. It attributes the explosion to the weakening of the channel plating through depreciation. The material also appears to have been in a fatigued condition. The observations, diagrams and statistics are of particular interest to all concerned in like processes.

THE WILL of the widow of Herman Frasch, who invented the Frasch method of mining sulphur, provides that the entire estate, valued at several million dollars, shall be devoted to research in the field of chemical agriculture. Herman Frasch died in Paris ten years ago. He worked with John D. Rockefeller as chemist for the Standard Oil Co. and while there discovered his process for taking sulphur out of the ground. He carried on his operations through the Union Sulphur Co.

DR. ROBERT HELLON, whose death took place at Whinthwaite, Seascale, on November 9, at the age of 70 years, served for 35 years as public analyst for Cumberland and Westmoreland. He was a Ph.D. of Heidelberg, and had a high reputation as an analytical chemist. During the war he did much useful work of an advisory character. He was senior partner in the firm of Hellon and Mann, of the County Analysts Laboratory, Whitehaven, and we understand that it is the intention of the surviving partner, Mr. Thomas Mann, who has been associated with Dr. Hellon for the past 32 years, to continue the practice under the title of Hellon and Mann.

SIR JOHN DEWRANCE was on Wednesday, elected president of the British Cast Iron Research Association.

FATAL ACCIDENTS in the chemical industry during October numbered three; none is recorded in the clay, stone, glass and allied industries.

A PAISLEY FIRM has received an order from a German firm of soap manufacturers for a double-effect evaporator plant for the production of glycerine from spent lyes.

MR. H. E. WRIGHT, steelworks manager at the Frodingham Steelworks, has been appointed general manager of the Templeborough Steelworks, Rotherham, one of the largest steelworks in England.

A PETITION that calcium cyanide be placed on the list of goods permitted to be imported free of duty into the Australian Commonwealth has been received by the Australian Minister of Customs from the Stockowners' Association.

THE MUNICIPALITY OF COPENHAGEN has placed another large order for water-tube boilers with the Vickers-Spearing Boiler Co., of Barrow-in-Furness. This is the second contract recently placed by the municipality with the company.

A LECTURE was given on Tuesday, before the Chemical Association at the Northern Polytechnic, by Dr. J. T. Dunn, on "Research and Industry," in which he said that the results of organised research had been so striking that it was difficult to imagine that our manufacturers would ever revert to the old condition of things.

A WIDNES EXPLOSION formed the subject of many exaggerated reports last week. No lives were lost, but an exceptional escape of chlorine at the Pilkington-Sullivan works of the United Alkali Co., due to a leaky valve, resulted in the gassing of several men. Only one man was sufficiently affected to require to be taken home.

A GREAT FIRE, followed by a series of explosions, wrecked the saltpetre plant of the Richardson Chemical Co. at Jersey City on Friday, November 15. Fifteen persons were injured and nine hundred families are said to have been rendered homeless. Reports state that the premises of the American Sugar Refining Company were also involved.

GERMAN REPORTS STATE that the warfare in China has interfered with industrial operations and materially cut down Chinese consumption of indigo colours. German manufacturers who found a large market for indigo paste in China have been seriously hit, and it is reported that the indigo section of the Badische plant at Ludwigshafen has been closed.

IN A LECTURE ON "CORROSION" at Birmingham on Friday, November 14, Dr. Newton Friend, head of the chemical department at Birmingham Technical Schools, mentioned an occasion when stainless steel knives were used at dinner they stained badly. Pickles figured in the menu, and on analysis it was found that the pickles contained sulphuric acid. Dr. Friend outlined the ionic and colloid theories of corrosion.

THE ADMINISTRATIVE COMMITTEE of the National Union of Manufacturers are urging the Government to introduce a Safeguarding of Industries Bill with wider scope and more simplified procedure than the Act of 1921. The Union also asks for legislation dealing with the amendment of Merchandise Marks Act in accordance with the recommendations of the Government Committee of 1920 and a Bill to put into force the findings of the Royal Commission, dated 1901, on the ratings of machinery.

THE ANNUAL GENERAL MEETING of the Junior Institution of Engineers was held on Friday, November 14, when the chairman, Mr. C. O. Mourant, said that the Institution had maintained a very steady position in the past few years, which had been of a very trying nature, and there was a very good prospect now of going ahead in point of membership and usefulness. The success of the Engineers' Register was recorded, appointments having been obtained for sixty out of ninety two members on the register.

THE FOLLOWING OFFICERS AND COMMITTEE were elected for the Manchester College of Technology Evening Students Chemical Society: — President: Professor F. L. Pyman, F.R.S.; Vice-Presidents: The Principal, Professor Knecht, Mr. Huebner, Capt. Sinnatt, Mr. Radcliffe, Mr. John Allen, Mr. Grant, Dr. Wood, Mr. McCullock, Mr. Roberts, Mr. Rowbottom; Hon. Secretary: Mr. J. E. Haslam; Assistant Hon. Secretary: Mr. J. Winterbottom; Hon. Treasurer, Mr. C. D. Young; Committee: Messrs. J. Waywell, R. V. Taylor, J. Dougherty, T. Ward, H. Frankland, B. Holt, and A. E. Mitchell.

The Faraday Society

A MEETING of the Faraday Society was held in London on Monday and a number of papers dealing with theoretical chemistry were presented. In a paper on "The Kinetic Theory of Evaporation," Dr. D. B. Macleod put forward a theory that the ratio of the density of the vapour above a liquid to the density of the liquid was really the ratio of the number of molecules with sufficient speed to escape from the liquid to the number with insufficient speed. Messrs. R. W. E. B. Harman and F. P. Worley contributed a paper on "The Hydrolysis of Alkali Cyanides in Aqueous Solution," measurements being made by a vapour pressure method. Dr. Macleod also contributed a paper on "Viscosities of Liquids at Their Boiling Points." A paper by Mr. S. S. Joshi on the "Viscosity of Reversible Emulsions" should not be without practical interest as the emulsions examined were made from oils with soaps. Viscosity was found to increase with increase of the disperse phase and reach a maximum at the reversal point, followed by a sudden drop in viscosity upon inversion. Another paper, by Messrs. J. T. Howarth and F. P. Burt described a new design of apparatus for measuring the coefficient of deviation from Boyle's Law.

Metallurgy as a Career

A BRIGHT future for young men in the metallurgical industry was the keynote of the presidential address by Professor T. Turner to the Metallurgical Society of the University of Birmingham on Tuesday last.

Professor Turner said the session had been extremely interesting and successful, and a larger number of students had worked in the department than ever before. The difficulty of placing men in situations was diminishing. That difficulty had arisen at the close of the war, when the state of the metal industry was such that their young men were hampered at the outset of their careers. This year, however, positions had been more readily found, and as the new entries were smaller than they had been for a number of years, the future prospects of students were satisfactory.

In his paper on "The Oxidation of Metals," Professor Turner explained how various tints were obtained and wastage of metal in high temperatures prevented. Special attention was devoted to the temper colours on steel and to the transparent films obtained on copper. The latter were shown to consist of cupric oxide of metal. It was suggested that the transparency was due to the solution of cupric oxide in copper at a temperature in the neighbourhood of 200° C.

Electricity from Flowing Petrol

AT the inquest at Stanford-le-Hope (Essex) on two persons killed by an explosion during the filling of two tanks with petrol, Maurice George Bland, consulting engineer, of London, described tests he and his partner had made leading to the conclusion that the explosion was probably caused by a high tension spark following friction between petrol particles which had been agitated under pressure, and by acceleration produced by the gravity in the pipes feeding the tanks. It had been known, he added, that petrol flowing through a pipe could cause electrical disturbance by the fact of friction, but it had not been known this could arise when the vessel was not insulated. This was a fresh discovery.

Mr. Clement, manager of the Shellmex Works, where the accident occurred, said that instructions had now been given for a conducting wire to be connected through the tanks to earth direct, by which electricity thus generated might escape.

The Gas Industry and Wembley

THAT the results demonstrate that the money expended on the British Empire Gas Exhibit at the British Empire Exhibition was well spent is the view of the members of the Gas Industry who were responsible for what was one of the largest enterprises represented in the Palace of Industry, states the *Daily Telegraph*. For many years past the number of gas consumers has been steadily increasing, and those in control are convinced that the Wembley venture has made progress doubly sure, not only now but in the years to come. The Wembley display was backed up by an attractive advertising campaign, and the results of the combined appeals have already become apparent in a remarkable rush for gas fires which is being experienced at the beginning of the winter season.

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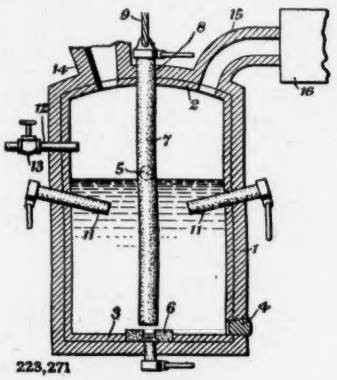
Patent Literature

Abstracts of Complete Specifications

223,271. VOLATILISING AND OXIDISING MINERALS, METHOD OF AND APPARATUS FOR. E. C. R. Marks, London. From the Cobb Electro Reduction Corporation of Canada, Ltd., 43, Victoria Street, Toronto, Canada. Application date, June 11, 1923.

This apparatus is for recovering volatile oxides from a mineral compound or ore, the mineral being heated in an atmosphere containing oxygen to form the oxide. When such a process is carried out in an electric furnace, the electrode which extends into the oxidising space is liable to become oxidised, and the object is to avoid this difficulty. The crucible 1 is provided with an arched roof 2 and with



tapping holes 4, 5 at the bottom and at a higher level respectively. An electrode 6 having a number of upward projections is embedded in the floor, and a movable electrode 7 extends downwards through the roof to within a short distance of the electrode 6. A number of electrodes 11 extend through the side walls arranged in opposed pairs, and air is admitted to the upper part of the furnace through the pipe 12. The furnace is applicable for the oxidation of substances such as molybdenite, zinc sulphide, lead sulphide, antimony sulphide, arsenides of various metals, compounds of tin, vanadium, etc.

The ore is concentrated by gravity so that it has a low percentage of gangue, and is then charged into the furnace through the opening 14 on to a flux of fluorspar, coke and old silica slag which fills the furnace to the level 5. In starting the furnace the electrode 7 is lowered into the flux to fuse it, and old silica slag, such as ferrous and calcium silicates, is poured into the retort, and the electrode 7 is gradually raised as the slag is fused. When the fused bath reaches the level 5 the electrode 7 is removed and the opening 8 closed, and air is admitted through the pipe 12. The bath is then kept molten by means of the electrodes 11, which are submerged and not liable to oxidation. At this stage the ore concentrate is fed through the shaft 14, and is immediately volatilised and oxidised, and the oxide is drawn off through the outlet 15. If the concentrate contains little gangue, the slag need only be tapped off occasionally, and the current consumption is therefore low. The heat is supplied to the ore by means of the molten slag. Instead of using the electrodes 6, 7, the furnace may be heated by coal or gas until the slag is high enough to submerge the electrodes 11. Some modifications of the furnace are described, including one suitable for use with three-phase current.

223,297. FUEL DISTILLATION. Electrical Improvements, Ltd., Milburn House, Newcastle-on-Tyne, and E. G. Weeks, 11, Park Terrace, Dunston-on-Tyne, Durham. Application date, July 17, 1923.

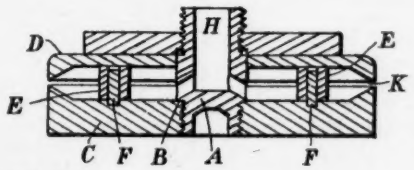
In distilling soft bituminous coal in a vertical retort the fuel becomes plastic in one zone and is liable to stick together and obstruct the retort. In this invention the incoming charge of fuel is mixed with sufficient coke to prevent the sticking together. The coke may be the residue extracted from the retort. As applied to low-temperature distillation, the retort is provided with a jacket and the fuel supplied is preheated by means of gases from the retort jacket. The coke discharged at the bottom of the retort is raised by a bucket elevator which discharges it into the charging hopper of the retort, where it meets the fresh fuel. The object of the invention is attained by adding coke in a proportion of 10–25 per cent. of the weight of the fuel. The process is particularly applicable to low-temperature distillation.

223,302. HEAT TREATMENT OF SOLID CARBONACEOUS MATERIALS, AND THE MANUFACTURE OF BRIQUETTES. B. Laing, Abdale House, Hatfield, Herts, and H. Nielsen, 13, Firs Avenue, Muswell Hill, London, N.10. Application date, July 17, 1923.

Carbonaceous material is distilled in two stages. In the first retort the material is heated until it reaches the sticky stage; it is then withdrawn and moulded into briquettes without the use of a binder. The briquettes are then subjected to a further distillation at a higher temperature. The hot gases from the second stage are passed through the first stage retort to heat the fuel. The temperature in the primary stage is about 350° C., so that material such as pitch may be added to the fuel if desired to act as a binder. The second stage is preferably conducted at about 600° C. The whole process is continuous, the plastic fuel being conveyed to the briquetting machine and thence to the second stage retort without appreciable loss of heat.

223,347. ADJUSTABLE CENTRIFUGAL MACHINE FOR EMULSIFYING. E. M. Ferns, 34, Abbey Street, Cork, Ireland, E. W. R. Stapley and J. Harrison, Moorgate Station Chambers, London, E.C.2. Application date, August 9, 1923.

A vertical shaft A capable of being driven at high speed is provided with a shoulder B against which rests a dished plate D, which is screwed on to the shaft. The co-operating dished plate D fits over a plain portion of the shaft, and is secured by a nut G. The plate C carries guide pins F over which



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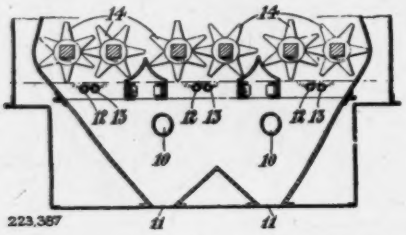
distance sleeves E are placed to obtain the desired width of peripheral aperture K between the plates C, D. The material to be emulsified is supplied through the hollow shaft H by using sleeves E of different length. The width of the space K can be adjusted to the requirements of different materials.

223,387. LOW TEMPERATURE FUEL DISTILLATION. Merz and McLellan, Collingwood Buildings, Newcastle-on-Tyne, and 32, Victoria Street, Westminster, London, S.W.1., and E. G. Weeks, 11, Park Terrace, Dunston, Durham. Application date, October 3, 1923.

The object is to overcome the difficulty due to the sticking together of bituminous coal when subjected to low-temperature distillation. It is known to use superheated steam for this purpose—*e.g.*, by raising the temperature of the steam which is passed through the fuel to distil it. It is now found that a more efficient distillation may be effected with the use of less steam at a lower temperature if some additional heat is generated within the retort by a regulated amount of air, causing a limited combustion of the fuel. The steam and/or the air are preheated to about the ignition temperature of the fuel. The quanitty of air is only sufficient to burn about 2–4 per cent. of the fuel, and the preheated temperature is about 450° C. Steam is admitted in the usual manner through perforated steam pipes 10 in the lower part of the retort, and air admission pipes 12, 13 are arranged transversely of the retort below coke extractor rollers 14. The pipes 12, 13 may alternatively be arranged above these rollers.

to protect them from the effects of high temperature. Any desired distillation temperature may be obtained by regulating the admission of air, so that the process is applicable to various qualities of fuel. The proportion of air to steam employed may be 5 : 7, and in this case 0·4–0·6 lb. of steam are used



per lb. of fuel, compared with 1 lb. of steam per lb. of fuel used with pure steam distillation. The volume of gas passing through the retort is increased, so that oil vapours are more rapidly carried away.

223,410. Diarylguanidines, Manufacture of. British Dyestuffs Corporation, Ltd., 70, Spring Gardens, Manchester, and C. J. T. Cronshaw, W. J. S. Naunton, and S. J. Green, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, November 1, 1923.

Diarylguanidines have been manufactured by desulphurising a solution either of ammonia and diarylthiourea with lead oxide, filtering, and concentrating the solution, or of an ammonium salt and diarylthiourea with lead oxide, filtering off the lead sulphide, replacing the alcohol in the filtrate with water, and precipitating the base with caustic alkali. In this invention, a pure product substantially free from lead is obtained. Ammonium salt and diarylthiourea are suspended in dilute alcohol, and desulphurised by boiling with lead carbonate (white lead or basic lead carbonate). All the alcohol is replaced by boiling water and the mixture filtered to remove lead sulphide. The solution is run into hot dilute caustic alkali, and the diarylguanidine base is precipitated free from occluded diarylguanidine salt. This last effect is not obtained if the base is precipitated by adding the caustic alkali to the solution of its salt.

223,481. Mordant Dyestuffs, Manufacture of. Durand and Huguenin Akt.-Ges., Basle, Switzerland. Application date, March 3, 1924. Addition to 197,940.

Specification No. 197,940 (see The Chemical Age, Vol. IX., p. 102) describes the preparation of mordant dyestuffs by treating the condensation products formed by the reaction of one molecular proportion of chloranil with two molecular proportions of para-aminosalicylic acid or its derivatives, in concentrated sulphuric acid at a raised temperature. This transformation may be combined with a nitration which allows of operating at a lower temperature. The quinone dianilido compounds giving brown tints are converted into new dyestuffs giving violet tints. In this invention, other quinone dianilido compounds which are derived from trichlortoluquinone or from ortho-animosalicylic acid or its derivatives can be employed. In an example, the condensation product of ortho-aminosalicylic acid and chloranil is dissolved in concentrated sulphuric acid, and nitro-sulphuric acid is then gradually added and the mixture raised slowly to 90° C. The mixture is cooled and poured into ice water to precipitate the dyestuff. The dyestuff is similarly prepared from the quinone dianilido body obtained from trichlortoluquinone and para-aminosalicylic acid. Other examples are given.

223,489. Preliminary Treatment or Purification of Illuminating or Coke Oven Gases Intended to be Subjected to Partial Liquefaction for the Separation of their Constituents. L'Air Liquide Soc. Anon. pour l'Etude et l'Exploitation des Procedes G. Claude, 48, Rue St. Lazare, Paris. International Convention date, November 20, 1923.

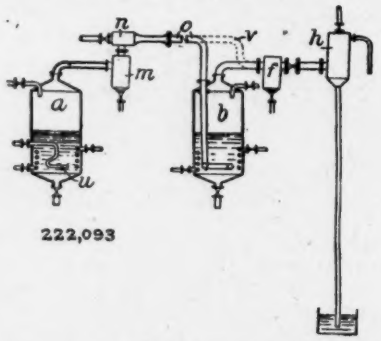
In this process the gas is subjected to progressive cooling in temperature exchangers preceding the partial liquefaction apparatus. Ethylene is extracted together with other impurities such as ethane and acetylene by circulating the gas in an upward direction through the zone where the ethylene liquefies up to the zone where considerable liquefaction of the methane takes place. The ethylene thus progressively liquefied flows back in counter current to the gases, so that the methane in it is vaporised. The liquid containing ethylene, ethane, and acetylene is then extracted. The process is carried out with three heat exchangers in series.

Note.—Abstracts of the following specifications which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention: 201,922 ("Allchemin" Algemeine Chemische Industrie Akt.-Ges., and R. Jahoda) relating to production of phosphorescent zinc sulphide, see Vol. IX., p. 401; 202,631 (Chemosan Akt.-Ges.) relating to solutions of mercury derivatives of hydroxy-sulpho-benzoic acids, and their homologues, see Vol. IX., p. 465; 207,553 (Kalle & Co., Akt.-Ges.) relating to production of vat colouring matters, see Vol. X., p. 122; 215,789 (Brunner, Mond & Co., Ltd.) relating to synthesis of ammonia, see Vol. XI., p. 101.

International Specifications not yet Accepted

222,093. Purifying Oils. Metallbank und Metallurgische Ges., Akt.-Ges., 45, Bockenheimer Anlage, Frankfurt-on-Main, and W. Gensecke, 87, Hamburgerstrasse, Bad Homburg, Germany. International Convention date, September 18, 1923.

Oils and fats are purified in vacuo by steam. The two treatment chambers *a*, *b* are exhausted by an injection con-



222,093

denser *h*, and steam is admitted through a pipe coil *u* to the chamber *a*. The vacuum in the chamber *a* is increased by a steam injector *n*, and the steam and vapour from this chamber pass through a trap *m* and are then carried with the injector steam to the next chamber *b*. If the second chamber is not used, the steam passes through a pipe *v* direct to a trap *f* and condenser *h*.

222,094. Dyes. Farbwerke vorm. Meister, Lucius, and Brüning, Hoechst-on-Main, Germany. International Convention date, September 27, 1923.

A 2-anil of a 2 : 3-diketodihydro-6-alkyloxy-thionaphthene or a nucleal substitution product is heated with a nucleal substitution product of 3-oxythionaphthene to produce a thioindigoid dye. Alternatively a 3-oxy-6-alkyloxy-thionaphthene or a nucleal substitution product is heated with a nucleal substitution product of 2 : 3-diketodihydro-thionaphthene-2-anil. These dyes give red shades on cotton resembling those of alizarin, which may be varied by introducing further substituents. Components used include 6-ethoxy-3-oxythionaphthene and 4-methyl-6-chloro-2 : 3-dihydro-3-keto-2-(*p*-dimethylamino)-anil; 4-methyl-5 : 6-dichloro-3-oxythionaphthene and 6-ethoxy-2 : 3-dihydro-3-ketothionaphthene-2-(*p*-dimethylamino)-anil; 6-methoxy-3-oxythionaphthene and 4-methyl-6-bromo-2 : 3-dihydro-3-ketothionaphthene-2-(*p*-dimethylamino)-anil. To obtain 4-methyl-6-chloro-, and 6-ethoxy-2 : 3-dihydro-3-ketothionaphthene-2-(*p*-dimethylamino)-anils, nitrosodimethyl-aniline is treated with the corresponding 3-oxythionaphthenes.

222,103. Vulcanising Indiarubber. H. O. Chute, 52, East 41st Street, New York. International Convention date, September 18, 1923.

The process is for preparing a vulcanization accelerator According to one method, aldehyde ammonia is added to an aqueous solution of thiourea, yielding a product which is probably $C_9H_{11}N_3S$. Alternatively crude calcium amide

is dissolved in water, sulphuric acid is added to precipitate the calcium salt, and ammonium sulphide then added. Acetaldehyde is added to the solution which contains ammonia and thiourea, and the product is crystallised out. Other aldehydes may alternatively be used.

222,110. MAGNESIUM SALTS. A. Nihoul, 29, Passage des Favorites, Paris. International Convention date, September 19, 1923.

Magnesium carbonate, dolomite, or calcined dolomite is suspended in water, and treated with carbon dioxide in the presence of calcium sulphate. The resulting solution is filtered to remove calcium carbonate, and then boiled to convert the magnesium bicarbonate into carbonate. The carbonate is filtered off and the solution contains pure magnesium sulphate, which may be crystallised. To prepare magnesium carbonate, the solution containing the bicarbonate is treated with sodium carbonate. The magnesium carbonate obtained is extremely light, and may be converted into oxide by calcining.

222,120 and 222,125. DYES. Farbwerke vorm. Meister, Lucius and Brüning, Hoechst-on-Main, Germany. International Convention dates, September 19 and September 18, 1923.

222,120. The product obtained by treating isatine with phosphorus pentachloride in benzene is condensed with 8-chloro-1 : 2-naphthioindoxyl to obtain a thioindigoid dye. Other derivatives may be similarly employed.

222,125. This is an addition to patent No. 205,502 (see THE CHEMICAL AGE, Vol. IX., p. 693) which describes the condensation of benzanthrone or its substitution products not substituted in the 1^1-position, with aromatic acid chlorides. In this invention the process is applied to benzanthrones substituted in the 1^1-position. In an example, β-methylbenzanthrone or 1^1-chlorbenzanthrone are heated with benzoyl chloride, aluminium chloride and zinc chloride. Yellow shades are obtained on cotton from a red vat.

222,122. CEMENTS. E. Martin, 12, Rue du Roi, Aux, Bouches-du-Rhône, France. International Convention date, September 17, 1923.

A mixture containing iron oxide and calcium carbonate in the proportion of more than two molecules of calcium carbonate to each molecule of iron oxide is burned at a temperature below its melting point—*e.g.*, about 1,100° C. One molecule of lime is required for each molecule of alumina, and two molecules for each molecule of silica, if these compounds are present. Raw materials used include iron pyrites cinders, iron ores, and alumina sludges.

222,136. BENZOYL AND BENZYL RESORCINOLS. H. Hirzel, 5, Winkelweise, Zurich, Switzerland. International Convention date, September 19, 1923.

Resorcinol is condensed with hydrochloric acid by means of zinc chloride, giving an oily product which is washed with water and sodium bicarbonate solution, or it may be precipitated from its solution in sodium carbonate by carbon dioxide. The benzoyl resorcinol is reduced by zinc amalgam and hydrochloric acid, yielding benzyl resorcinol which is extracted and distilled in vacuo, and recrystallised from benzene.

222,141. TERPENE ALCOHOLS. G. Austerweil, 113, Boulevard Jean Jaures, Boulogne, France. International Convention date, September 19, 1923.

When β-pinene is heated with organic acids soluble in water, such as acetic or butyric acid, terpenyl esters are obtained, and may be converted into terpineol. If substituted aromatic acids insoluble in water are used, with a catalyst of the mixed anhydrides of boric and acetic acids, bornyl and isobornyl esters are produced. In an example, β-pinene is heated with salicylic or dichlorobenzoic acid, and some boroacetic anhydride dissolved in glacial acetic acid. Bornyl esters are obtained, from which borneol can be derived by saponification with caustic soda.

LATEST NOTIFICATIONS

224,505. Production of mixed ammonium and potassium salts. Soc. Chimique de la Grande Paroisse, Azote et Produits Chimiques. November 8, 1923.

224,509. Process for the treatment of sulphite-cellulose waste liquor. Dr. C. G. Schwalbe. November 6, 1923.

224,521. Process for making a highly-active charcoal in grains. Ges. für Chemische Produktion. November 5, 1923.

224,522. Manufacture of Bz-2'- oxybenzanthrones. Farbwerke vorm. Meister, Lucius, and Brüning. November 9, 1923.

Specifications Accepted with Date of Application

201,555. Desulphurising iron, steel, ferro-alloys and other metals, Process of—and composition of matter for use therein. Chemical Treatment Co. July 29, 1922.

202,629. Sulphuric acid, Manufacture of. E. A. Gaillard. August 17, 1922. Addition to 180,456.

206,144. Reverberatory furnaces. Heimsoth and Vollmer Ges. October 27, 1922.

210,465. Thionaphthisatin and its intermediate products, Manufacture of. Soc. of Chemical Industry in Basle. January 29, 1923.

210,797. Dry distillation of bituminous fuel, Process of and apparatus for. Syndikat für Gasforschung. February 1, 1923.

211,461. Acetylene or gaseous mixtures containing acetylene, Pyrogenic transformation of. F. Gros. February 14, 1923.

213,571. Catalytic oxidation of ammonia. G. Kassner. March 31, 1923.

215,705. Liquefaction and saccharification of starch, Process for. Dextrin Automat Ges. May 9, 1923.

216,475. Cellulose solutions, Manufacture of. L. Lilienfeld. May 25, 1923.

219,276. Thionaphthisatin and its intermediate products, Manufacture of. Soc. of Chemical Industry in Basle. July 18, 1923. Addition to 210,465.

219,676 Vanillin, Manufacture of. Akt.-Ges. für Anilin Fabrikation. July 28, 1923.

223,997. Containers for the storage of acids, corrosive liquids, and the like. New Eccles Rubber Works, Ltd., and S. W. Cox. August 3, 1923.

224,085. Fractional distillation, Process of. Dorman, Long and Co., Ltd., J. A. Roelofsen, and H. M. Lowe. November 3, 1923.

224,173. Tube mills, rotary kilns, rotary screens, and the like. D. Brown and Son (Huddersfield), Ltd., and W. H. Childs. May 22, 1924.

224,174. Centrifugal machines. C. G. T. Salenius. May 23, 1924.

224,179. Installations for carbonising coal or other fuel. Spencer-Bonecourt, Ltd., and W. Gregson. May 28, 1924.

Applications for Patents

Algemeene Norit Maatschappij and Potts, H. E. Manufacture of decolorizing-carbon. 26,991. November 12. (August 9, 1923.)

Algemeene Norit Maatschappij and Potts, H. E. Manufacture of active carbon. 26,992. November 12. (February 22.)

Algemeene Norit Maatschappij and Potts, H. E. Production of active carbons. 26,993. November 12. (May 9.)

Anjow, K. Treating tungsten ore to obtain tungsten oxide. 27,129. November 13.

Badische Anilin-& Soda-Fabrik and Johnson, J. Y. Carrying out reactions under pressure. 27,027. November 12.

Badische Anilin-& Soda-Fabrik and Johnson, J. Y. Manufacture of coloured cellulose plastics, etc. 27,028. November 12.

Barnard, C. M., Mercer, R. H., and Roth, J. B. Production of dyestuffs for cellulose esters. 27,317. November 15.

British Drug Houses, Ltd., and Ellis, H. A. Apparatus for comparing colour of liquids. 27,006. November 12.

British Dyestuffs Corporation, Ltd. Vulcanization of rubber, etc. 27,036. November 12.

Brutzkus, M. Process for obtaining water gas from liquid hydrocarbons. 26,786. November 10.

Chemische Fabrik Pott and Co., and Pospiech, F. Wetting-out means for carbonization, dyeing, etc. 27,047. November 12.

Coley, H. E. Manufacture of zinc. 26,887. November 11.

Compagnie de l'Azote et des Fertilisants Soc. Anon. Preparation of a solution of cyanamide. 27,018. November 12. (Switzerland, November 20, 1923.)

Dunstan, A. E. Purification of liquids. 27,132. November 13.

Raduner & Co., Akt.-Ges. Apparatus for use in processes wherein hypochlorites are used. 26,883. November 11. (Switzerland, October 21.)

Scottish Dyes, Ltd., Thomas, J., and Thomson, R. F. Manufacture of dyestuffs, etc. 27,042. November 12.

Sharp and Dohme, Inc. Manufacture of alkyl resorcinols. 27,259. November 14. (United States, July 31, 1923.)

Simon, A., Simon Bros. (Engineers), Ltd., and Simon, L. J. Manufacture of insecticides, etc. 26,781. November 10.

Stevenson, W. J. Manufacture of acetyl cellulose. 26,878. November 11.

Woods, K. C. Chemical fire-extinguisher. 27,008. November 12.

Re-registration of Industrial Property Rights in Japan

NOTIFICATION has been received that the time limit for re-registration in Japan of industrial property rights which were registered at the time of the earthquake in September, 1923, has been extended to January 31, 1925.

British owners of Patents, Designs and Trade Marks are reminded that it is essential to make application for re-registration before the above date, and that all applications must be made through a representative residing in Japan.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing those firms' independent and impartial opinions.

London, November 20, 1924.

THE improved tone which has been noticeable during the last few weeks continues, and trade is still progressing on improved lines. Prices keep very steady generally, and there are only one or two weak spots; other price changes are in the upward direction. Export inquiry continues fair with an improving tendency, and, what is more important, overseas buyers are now beginning to place substantial contracts for future delivery.

General Chemicals

ACETONE is only in moderate demand, but the price is unchanged at about £93 to £94 per ton.

ACID ACETIC is weak and selling pressure continues; the market is nominally £41 per ton for 80% and £42 per ton for pure 80%.

ACID CITRIC.—Continues quiet and unchanged at 1s. 3d. per lb., less 5%.

ACID FORMIC.—The improved demand continues and 85% is firm at £53 per ton, ex wharf.

ACID LACTIC has been much more active and the material is strong at £43 per ton for 50% by weight.

ACID OXALIC.—The price on the continent has advanced, and although there has been no sympathetic movement in this country higher prices are expected; the material can still be obtained at 4d. per lb., delivered.

ACID TARTARIC is inclined to be somewhat weak under pressure from second-hand sellers; the market is nominally round about 1s. per lb., less 5%, but for firm business undoubtedly lower quotations could be obtained.

ALUMINA SULPHATE is in fair demand and very steady at £7 5s. per ton for 17–18%.

ARSENIC continues slow, but a better feeling seems to be in evidence. The nominal price for Cornish is round about £43 per ton, with Japanese still at a discount.

BARIUM CHLORIDE continues in good demand and is very steady at £12 10s. per ton.

COPPER SULPHATE.—Quite a satisfactory volume of business is reported and the price is firm at £23 per ton.

CREAM OF TARTAR.—The demand perhaps here is a shade better, but the price is unchanged at £80 per ton.

FORMALDEHYDE continues flat and in buyers' favour; the price is nominally £48 per ton, ex wharf, and the decline in the price of this material seems to be overdone.

EPSOM SALTS are extremely strong and are quoted to-day at £4 5s. per ton, and an advance appears to be imminent.

LEAD ACETATE has been in brisk request both for home trade and for export; to-day's quotation is £46 to £46 10s. for white and £42 to £43 for brown.

LEAD NITRATE has been inquired for, and business is being done at £43 10s. per ton.

LIME ACETATE.—A better feeling seems to be in evidence here, although the price is unchanged at round about £14 per ton and £11 per ton for brown.

MAGNESIUM CHLORIDE.—Unchanged.

METHYL ALCOHOL is in slow demand, with price unchanged at £60 per ton.

POTASSIUM CAUSTIC is only in moderate request at £32 per ton.

POTASSIUM CARBONATE 96/98% is offered at round about £23 per ton, and the demand is fair.

POTASSIUM BICHROMATE.—British makers announce a reduction in price for home trade contracts over next year to 5d. per lb., less 5% carriage paid, usual terms.

POTASSIUM PERMANGANATE has steadied slightly and the value is unchanged at 7¼d. per lb.

POTASSIUM PRUSSIATE is quite active and is well held at 7½d. per lb.

SODIUM ACETATE.—The market has improved here and quite a fair business is reported at £22 10s. per ton.

SODIUM BICHROMATE.—British makers announce a reduction in price for 1925 contracts to 4d. per lb., less 5%.

SODIUM HYPOSULPHITE.—British makers' prices are unchanged, and a good business is being done at £9 10s. per ton for commercial.

SODIUM NITRITE is steady at £25 per ton.

SODIUM PRUSSIATE continues its better tendency, and the price is inclined to rise; it may be quoted to-day at the average of 4⅛d. per lb.

SODIUM SULPHIDE.—Unchanged in value with a fair business passing.

Coal Tar Products

The firm tone of the market for all coal tar products is well maintained, and prices generally maintain an upward tendency. This is particularly marked in the case of benzol. The demand for this product far exceeds the present supply, and prices have risen rapidly in the last few days.

90% BENZOL.—Business has been done at 1s. 7½d. and 1s. 8d. per gallon on rails at makers' works, showing an advance of nearly 3d. per gallon on last week's prices, and there are indications that the price will rise further.

PURE BENZOL is scarce, the demand for 90% benzol being reflected on this article. It is worth about 2s. per gallon on rails.

CREOSOTE OIL has a steady demand for export, and prices remain firm at 5¼d. to 5½d. per gallon on rails in the North, while the price in the South is from 6d. to 6¼d. per gallon.

CRESYLIC ACID shows no change from last week, the pale quality 97/99% being worth 1s. 11d. per gallon on rails, while the dark quality 95/97% is quoted at 1s. 7d. to 1s. 7½d. per gallon.

SOLVENT NAPHTHA.—The price and demand for this product is also influenced by the shortage of benzol, and it is firm at 1s. 3d. per gallon on rails.

HEAVY NAPHTHA is stationary at 1s. to 1s. 1d. per gallon on rails.

NAPHTHALENES show no particular improvement, the low qualities remaining at about £3 10s. to £4 10s. per ton, while of the higher grades 76/78 quality is quoted at £6 to £6 10s. per ton, and 74/76 quality at £5 10s. to £6 per ton.

PITCH remains in good demand, and prices still have an upper tendency. To-day's values are 47s. 6d. to 52s. 6d. f.o.b. London; 47s. 6d. to 50s. f.o.b. East Coast; 45s. to 50s. f.o.b. West Coast.

SULPHATE OF AMMONIA.—Demand is satisfactory and prices are unchanged.

Nitrogen Products Market

Export.—During the last week considerable sales have been made for export at the prices at which producers have been holding for some time, £13 15s. per ton f.o.b. for prompt delivery and £14-£14 10s. per ton f.o.b. for forward delivery.

There have been considerable inquiries from buyers in the United States but the British producers have made no sales for this country. However, it is clear from American reports that other countries have sold to the United States and this has had a hardening effect on the market.

Home Trade.—The producers are selling freely for delivery up to December 31 and considerable quantities have been booked for later delivery at prices which will be fixed for these periods. Up to date the total home sales for this year are nearly 20,000 tons in advance of those for last year.

Nitrate.—The Nitrate of Soda market is unchanged. Prompt sales are being made from £11 15s. to £11 18s. per ton and forward sales from £11 18s. to £12 4s. per ton in accordance with the position.

It appears that the producers' estimates of European consumption will not be realised and that large stocks will be carried over unless they prefer to make reductions in prices. However, the American consumption is quite up to estimates, so that there is no likelihood of any serious change in price.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at sellers' works.

General Heavy Chemicals

Acid Acetic 40% Tech.—£23 10s. per ton.
Acid Boric, Commercial.—Crystal, £45 per ton Powder, £47 per ton
Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.
Acid Nitric 80° Tw.—£21 10s to £27 per ton, makers' works according to district and quality.
Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 65s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.
Bleaching Powder.—Spot, £11 d/d.; Contract, £10 d/d. 4 ton lots
Bisulphite of Lime.—£7 10s. per ton, packages extra.
Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)
Calcium Chloride.—£5 17s. 6d. per ton d/d.
Copper Sulphate.—£25 per ton.
Methylated Spirit 64 O.P.—Industrial, 2s. 7d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.
Nickel Sulphate.—£38 per ton d/d. Normal business.
Nickel Ammonia Sulphate.—£38 per ton d/d. Normal business.
Potash Caustic.—£30 to £33 per ton.
Potassium Bichromate.—5½d. per lb.
Potassium Chlorate.—3d. to 4d. per lb.
Salammoniac.—£32 per ton d/d.
Salt Cake.—£3 10s. per ton d/d.
Soda Caustic, Solid.—Spot lots delivered, £16 7s. 6d. to £19 7s. 6d. per ton, according to strength; 20s. less for contracts.
Soda Crystals.—£5 5s. to £5 10s. per ton ex railway depots or ports.
Sodium Acetate 97/98%.—£24 per ton.
Sodium Bicarbonate.—£10 10s. per ton carr. paid.
Sodium Bichromate.—4½d. per lb.
Sodium Bisulphite Powder 60/62%.—£17 to £18 per ton, according to quantity, f.o.b., 1-cwt. iron drums included.
Sodium Chlorate.—3d. per lb.
Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool. Nominal.
Sodium Nitrite 100% basis.—£27 per ton d/d.
Sodium Sulphide conc. 60/65.—About £14 10s. per ton d/d.
Sodium Sulphide Crystals.—£9 per ton d/d.
Sodium Sulphite, Pea Crystals.—£15 per ton f.o.r. London, 1-cwt. kegs included.

Coal Tar Products

Acid Carbolic Crystals.—6½d. per lb. Quiet. Crude 60's 1s. 8d. to 1s. 10d. per gall. Market flat.
Acid Cresylic 97/99.—2s. per gall. Fair business at slightly easier prices. Pale 95%, 1s. 8d. to 1s. 11d. per gall. More inquiry. Dark, 1s. 8d. to 1s. 10d. per gall. Market dull.
Anthracene Paste 40%.—4d. per unit per cwt. Nominal price. No business.
Anthracene Oil, Strained.—6½d. to 7½d. per gall. Small demand. Unstrained, 6d. to 6½d. per gall.
Benzol.—Crude 65's.—7½d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 1½d. to 1s. 3d. per gall., ex works in tank wagons. Pure, 1s. 5½d. to 1s. 7d. per gall., ex works in tank wagons.
Toluol.—90%, 1s. 5½d. to 1s. 7d. per gall. More inquiry. Pure, 1s. 7d. to 1s. 9d. per gall. Small demand for home consumption.
Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.
Creosote.—Cresylic, 20/24%, 8d. to 8½d. per gall. Little demand. Middle Oil, Heavy, Standard specification, 5½d. to 6½d. per gall., according to quality and district. Market firmer.
Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 3d. to 1s. 4d. per gall. Demand good. Higher prices probable. Solvent 90/190, 11½d. to 1s. 1d. per gall. Demand maintained.
Naphthalene Crude.—Demand rather better. Cheaper in Yorkshire than in Lancashire. Drained Creosote Salts, £3 to £5 per ton. Demand slightly better. Whizzed or hot pressed, £6 to £9 per ton. Demand very poor.
Naphthalene.—Crystals and Flaked, £12 to £15 per ton, according to district.
Pitch.—Medium soft, 42s. 6d. to 60s. per ton, according to district. Prospects brighter.
Pyridine.—90/160, 18s. 6d. to 19s. per gall. Steady demand. Heavy, 11s. 6d. to 12s. More inquiry.

Intermediates and Dyes

Business in dyestuffs has increased considerably and the outlook is decidedly better.

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.
Acid H.—3s. 10d. per lb. 100% basis d/d.
Acid Naphthionic.—2s. 4d. per lb. 100% basis d/d
Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d
Acid Salicylic, technical.—1s. 1d. per lb. Improved demand.
Acid Sulphanilic.—9d. per lb. 100% basis d/d.
Aluminium Chloride, anhydrous.—1s. per lb. d/d.
Aniline Oil.—8d. per lb. naked at works.
Aniline Salts.—8½d. per lb. naked at works.
Antimony Pentachloride.—1s. per lb. d/d.
Benzidine Base.—3s. 10d. per lb. 100% basis d/d.
Benzyl Chloride 95%.—1s. 1d. per lb.
p-Chlorphenol.—4s. 3d. per lb. d/d.
p-Chloraniline.—3s. per lb. 100% basis.
o-Cresol 19/31° C.—4½d. per lb. Rather quiet.
m-Cresol 98/100%.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
p-Cresol 32/34° C.—2s. 1d. to 2s. 3d. per lb. Demand moderate.
Dichloraniline.—2s. 3d. to 3s. per lb.
Dichloraniline S. Acid.—2s. 6d. per lb. 100% basis.
p-Dichlorbenzol.—£85 per ton.
Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.
Dimethylaniline.—2s. 2½d. per lb. d/d. Drums extra.
Dinitrobenzene.—9d. to 10d. per lb. naked at works.
Dinitrochlorbenzol.—£84 10s. per ton d/d.
Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works 66/68° C. 1s. 2d. per lb. naked at works.
Diphenylaniline.—2s. 10d. per lb. d/d.
G. Salt.—2s. 3d. per lb. 100% basis d/d.
Monochlorbenzol.—£63 per ton.
a-Naphthol.—2s. 4d. per lb. d/d.
B-Naphthol.—1s. per lb. d/d.
a-Naphthylamine.—1s. 3½d. per lb. d/d.
B-Naphthylamine.—4s. per lb. d/d.
m-Nitraniline.—4s. 2½d. per lb. d/d.
p-Nitraniline.—2s. 2½d. per lb. d/d.
Nitrobenzene.—5½d. to 5¾d. per lb. naked at works.
o-Nitrochlorbenzol.—2s. per lb. 100% basis d/d.
Nitronapthalene.—10d. per lb. d/d.
p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.
p-Nitro-*o*-amido-phenol.—4s. 6d. per lb. 100% basis.
m-Phenylene Diamine.—4s. per lb. d/d.
p-Phenylene Diamine.—10s. 2d. per lb. 100% basis d/d.
R. Salt.—2s. 4d. per lb. 100% basis d/d.
Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.
o-Toluidine.—10d. per lb.
p-Toluidine.—2s. 10d. per lb naked at works.
m-Toluylene Diamine.—4s. per lb. d/d.

Wood Distillation Products

There is a general feeling that the fall in price of acetates during the last few weeks has reached its limit. The tendency is now to stiffen again.

Acetate of Lime.—Brown £11 10s. per ton d/d. and upward. Grey, £14 per ton. Liquor, 9d. per gall 32° Tw.
Charcoal.—£7 5s. to £9 per ton, according to grade and locality. Demand quiet, but price steady.
Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.
Red Liquor.—10d. to 1s. per gall. 14/15° Tw.
Wood Creosote.—2s. 9d. per gall. Unrefined.
Wood Naphtha, Miscible.—4s. 9d. per gall. 60% O.P. Solvent, 5s. per gall. 40% O.P. Firmer.
Wood Tar.—£4 to £5 per ton. Very quiet.
Brown Sugar of Lead.—£41 per ton. Steady market.

Rubber Chemicals

Antimony Sulphide.—Golden, 6½d. to 1s. 2d. per lb., according to quality. Crimson, 1s. 4d. to 1s. 6d. per lb., according to quality.
Arsenic Sulphide, Yellow.—1s. 11d. per lb.
Barytes.—£3 10s. to £6 15s. per ton, according to quality.
Cadmium Sulphide.—3s. 9d. to 4s. per lb., according to quantity.
Carbon Bisulphide.—£30 to £33 per ton, according to quantity. Again dearer.
Carbon Black.—7d. to 7½d. per lb., ex-wharf. Dearer.
Carbon Tetrachloride.—£60 to £65 per ton, according to quantity drums extra. Again dearer.
Chromium Oxide, Green.—1s. 3d. per lb.
Indiarubber Substitutes, White and Dark.—5d. to 9½d per lb Demand very brisk. Prices likely to remain steady owing to firmness of rapeseed oils.
Lamp Black.—£48 per ton, barrels free.
Lead Hyposulphite.—7½d. per lb.
Lithopone, 30%.—£22 10s. per ton.
Mineral Rubber "Rubpron."—£16 5s. per ton f.o.r. London

Sulphur.—£10 to £12 per ton, according to quality.
Sulphur Chloride.—4d. per lb., carboys extra. Dearer.
Sulphur Precip. B.P.—£47 10s. to £52 10s. per ton according to quantity.
Thiocarbanilide.—2s. 6d. per lb.
Vermilion, Pale or Deep.—5s. 1d. per lb. Dearer.
Zinc Sulphide.—7½d. to 1s. 8d. per lb., according to quality

Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£45 per ton ex wharf London in glass containers.
Acid, Acetyl Salicylic.—3s. 1d. to 3s. 3d. per lb., according to quantity. Sales steady. Price firm.
Acid, Benzoic B.P.—2s. 6d. per lb. Cheaper.
Acid, Boric B.P.—Crystal £51 per ton, Powder £55 per ton. Carriage paid any station in Great Britain.
Acid, Camphoric.—19s. to 21s. per lb.
Acid, Citric.—1s. 4d. per lb., less 5% for ton lots. Market still weak.
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in 2 cwt. lots.
Acid, Pyrogallic, Crystals.—6s. 9d. per lb. for 1 cwt. lots. Market firm. Increasing demand.
Acid, Salicylic.—1s. 6d. to 1s. 8d. per lb., according to quantity.
Acid, Tannic B.P.—2s. 10d. per lb. Forward quotations higher. Spot value likely to increase.
Acid, Tartaric.—1s. per lb., less 5%.
Amidol.—9s. per lb. d/d.
Acetanilide.—1s. 10d. to 2s. per lb. More inquiry.
Amidopyrin.—15s. per lb. for spot stocks.
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.
Ammonium Carbonate B.P.—£37 per ton.
Atropine Sulphate.—12s. 6d. per oz. for English make.
Barbitone.—13s. 9d. per lb. Slightly lower. Quiet steady demand.
Benzonaphthol.—5s. 3d. per lb. Small inquiry.
Bismuth Salts.—Prices reduced by about 1s. 3d. to 2s. 3d. per lb. on account of the fall in the price of the metal.
Bismuth Carbonate.—8s. 6d. to 10s. 6d. per lb. | Prices reduced owing to fall in price of metal. Prices according to quantity.
Bismuth Citrate.—8s. 6d. to 10s. 6d. per lb. |
Bismuth Salicylate.—8s. 0d. to 10s. 0d. per lb. |
Bismuth Subnitrate.—7s. 7d. to 9s. 7d. per lb. |
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.
Bromides.—Potassium, 1s. 11d. per lb.; sodium, 2s. per lb.; ammonium, 2s. 1d. per lb. Very scarce and dear. Prices uncertain.
Calcium Lactate—1s. 7d. to 2s., according to quantity. Fair demand and steady market.
Chloral Hydrate.—4s. per lb. Slightly easier.
Chloroform.—2s. 6d. per lb. for cwt. lots. Price advanced by 6d. per lb.
Creosote Carbonate.—6s. 6d. per lb. Little demand.
Formaldehyde.—£48 to £49 per ton, in barrels ex wharf London.
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 50%, 2s. 6d. per lb.
Guaiacol Carbonate.—9s. 9d. per lb.
Hexamine.—3s. per lb. Forward prices higher.
Homatropine Hydrobromide.—25s. to 30s. per oz.
Hydrastine Hydrochloride.—English make offered at 120s. per oz.
Hydroquinone.—4s. 3d. per lb. in cwt. lots. Foreign make.
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.
Iron Ammonium Citrate B.P.—2s. 1d. to 2s. 5d. per lb., according to quantity.
Magnesium Carbonate.—Light Commercial, £36 per ton net.
Magnesium Oxide.—Light Commercial, £75 per ton, less 2½%; Heavy Commercial, £25 per ton, less 2½%; Heavy Pure, 1s. 6d. to 2s. per lb., according to quantity. Steady market.
Menthol.—A.B.R. recrystallised B.P., 60s. per lb. For December deliveries. No spot deliveries available. Synthetic, 26s. to 35s. per lb. Increasing demand.
Mercurials.—Market very quiet. Red oxide, 5s. 3d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 6d. to 3s. 7d. per lb.; white precipitate, 4s. 7d. to 4s. 8d. per lb.; Calomel, 3s. 11d. to 4s. per lb.
Methyl Salicylate.—1s. 10d. to 2s. per lb.
Methyl Sulphonel.—22s. 6d. per lb. Slightly weaker.
Metol.—11s. per lb. British make.
Morphine and Salts.—Reduced by 1s. to 1s. 3d. per oz.
Paraformaldehyde.—2s. 8d. for B.P. Quality.
Paraldehyde.—1s. 4½d. to 1s. 6d. per lb., in free bottles and cases.
Phenacetin.—5s. 6d. per lb.
Phenazone.—6s. 9d. per lb. Competition has led to slightly lower quotations.
Phenolphthalein.—5s. 6d. per lb. For cwt. lots.
Potassium Bitartrate 99/100% (Cream of Tartar).—84s. per cwt. less 2½% for ton lots.
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb. Dearer.
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.
Potassium Iodide.—16s. 8d. to 17s. 5d. per lb., according to quantity. Good steady demand.
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.
Potassium Permanganate.—B.P. crystals, 7½d. per lb., carriage paid; commercial, 8d. to 8½d. per lb., carriage paid. Forward prices higher.
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Good market.
Resorcin.—5s. 3d. per lb.
Saccharin.—63s. per lb. in 50-lb lots.
Salol.—3s. 9d. per lb., for cwt. lots.
Silver Proteinate.—9s. per lb. for satisfactory product light in colour.
Sodium Benzoate, B.P.—2s. 6d. per lb. Ample supplies of good quality available.
Sodium Citrate, B.P.C., 1923.—1s. 11d. to 2s. 2d. per lb., according to quantity.
Sodium Hypophosphite, Photographic.—£13 to £15 per ton. according to quantity, d/d. consignee's station in 1-cwt. kegs.
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.
Sodium Nitroprusside.—16s. per lb. Less for quantity.
Sodium Potassium Tartrate (Rochelle Salt).—75s. to 82s. 6d. per cwt., according to quantity. Market steady, good demand.
Sodium Salicylate.—Powder, 2s. to 2s. 3d. per lb. Crystal, 2s. 2d. to 2s. 5d. per lb Flake, 2s. 6d. per lb.
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb., according to quantity.
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity. 1 cwt. kegs included.
Sulphonal.—14s. 6d. per lb. Little demand.
Thymol.—16s. 9d. per lb. Firmer.

Perfumery Chemicals

Acetophenone.—12s. per lb.
Aubepine.—15s. 3d. per lb.
Amyl Acetate.—3s. 6d. per lb. Much dearer.
Amyl Butyrate.—7s. per lb. Dearer.
Amyl Salicylate.—3s. 3s. per lb.
Anethol (M.P. 21/22° C.).—4s. 6d. per lb.
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 9d. per lb.
Benzyl Alcohol free from Chlorine.—2s. 9d. per lb.
Benzaldehyde free from Chlorine.—3s. 6d. per lb.
Benzyl Benzoate.—3s. 6d. per lb.
Cinnamic Aldehyde Natural.—18s. 9d. per lb.
Coumarin.—18s. 9d. per lb.
Citronellol.—17s. per lb.
Citral.—8s. per lb.
Ethyl Cinnamate.—12s. 6d. per lb.
Ethyl Phthalate.—3s. 3d. per lb.
Eugenol.—10s. per lb.
Geraniol (Palmarosa).—33s. 6d. per lb.
Geraniol.—11s. 6d to 18s. 6d. per lb.
Heliotropine.—6s. 9d. per lb.
Iso Eugenol.—16s. per lb.
Linalol ex Bois de Rose.—26s. per lb.
Linalyl Acetate.—26s. per lb.
Methyl Anthranilate.—9s. 6d. per lb.
Methyl Benzoate.—5s. per lb.
Musk Ambrette.—50s. per lb. Dearer,
Musk Xylol.—13s. 6d. per lb.
Nerolin.—4s. 9d. per lb.
Phenyl Ethyl Acetate.—15s. per lb.
Phenyl Ethyl Alcohol.—16s. per lb.
Rhodinol.—55s. per lb.
Safrol.—1s. 10d. per lb.
Terpineol.—2s. 4d. per lb.
Vanillin.—25s. 6d. per lb.

Essential Oils

Almond Oil, Foreign S.P.A.—15s. 6d. per lb.
Anise Oil.—2s. 10d. per lb.
Bergamot Oil.—16s. per lb.
Bourbon Geranium Oil.—35s. per lb.
Camphor Oil.—65s. per cwt.
Cananga Oil, Java.—11s. per lb.
Cinnamon Oil, Leaf.—6½d. per oz.
Cassia Oil, 80/85%.—9s. 9d. per lb.
Citronella Oil.—Java, 85/90%, 6s. 10½d. per lb. Ceylon, 3s. 8d. per lb.
Clove Oil.—8s. 3d. per lb. Dearer.
Eucalyptus Oil, 70/75%.—2s. 3d. per lb.
Lavender Oil.—French 38/40% Esters, 35s. per lb. Dearer.
Lemon Oil.—3s. per lb.
Lemongrass Oil.—5s. per lb.
Orange Oil, Sweet.—11s. per lb.
Otto of Rose Oil.—Bulgarian, 40s. per oz. Anatolian, 18s. per oz.
Palma Rosa Oil.—16s. 6d. per lb.
Peppermint Oil.—Wayne County, 35s. per lb. Japanese, 22s. 6d. per lb Nominal.
Petitgrain Oil.—9s. 9d. per lb. Dearer.
Sandal Wood Oil.—Mysore, 26s. 7d. per lb. Australian, 18s. 6d. per lb

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, November 20, 1924.

BUSINESS in the heavy chemical market remains fairly satisfactory and there is no change of importance to record, prices being on about the same level as last reported.

Industrial Chemicals

ACID ACETIC.—Glacial 98/100%, £57 to £68 per ton; 80% pure, £45 to £47 per ton; 80% technical, £44 to £46 per ton. All packed in casks delivered c.i.f. U.K. ports, duty free.

ACID BORACIC.—Remains unchanged. Crystal or granulated, £45 per ton; powdered, £47 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC, ICE CRYSTALS.—Quoted slightly higher at 5¼d. per lb., delivered.

ACID CITRIC, B.P. CRYSTALS.—Unchanged at about 1s. 3½d. per lb. less 5% ex store. Offered for early delivery at about 1s. 3d. per lb. less 5% ex wharf.

ACID FORMIC, 85%.—Spot material on offer at about £54 per ton ex store. Quoted £50 to £51 per ton c.i.f. U.K. ports, duty free.

ACID HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy ex works.

ACID NITRIC, 80°.—£23 10s. per ton ex station, full truck loads.

ACID OXALIC, 98/100%.—Unchanged at abut 3⅞d. per lb. ex store, but still in poor demand. Offered for prompt shipment from the continent at 3¼d. per lb. ex wharf.

ACID SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton ex works, full truck loads. Dearsenicated quality, 20s. per ton more.

ACID TARTARIC, B.P. CRYSTALS.—On offer at 11¾d. per lb. less 5% ex store. Offered for prompt shipment from the continent at 11¼d. per lb. less 5% ex wharf.

ALUMINA SULPHATE, 17/18%, IRON FREE.—On offer at £6 15s. per ton c.i.f. U.K. port, prompt shipment. Spot lots available at about £7 10s. per ton ex store.

ALUM.—Ammonium chrome alum quoted £18 10s. to £20 10s. per ton according to quality, f.o.b. U.K. port. Lump potash alum on offer at about £9 15s. per ton ex store. Quoted £8 15s. per ton c.i.f. U.K. port, prompt shipment from the continent.

AMMONIA ANHYDROUS.—Unchanged at about 1s. 6d. per lb. ex station. Containers extra and returnable, with possible slight reduction for large quantities.

AMMONIA CARBONATE.—Lump, £37 per ton; powdered, £39 per ton; packed in 5 cwt. casks, delivered U.K. port.

AMMONIA LIQUID, 880°.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantity, containers extra.

AMMONIA MURIATE.—Grey galvanizer's crystals of English manufacture unchanged at £30 per ton ex station. Offered from the continent at about £28 per ton c.i.f. U.K. port. Fine white crystals quoted £22 10s. per ton c.i.f. U.K. port.

ARSENIC, WHITE POWDERED.—Price further reduced. Spot lots now available at about £42/43 per ton ex store. Offered for early delivery at about £41 per ton ex wharf. Foreign arsenic on offer at about £33 per ton c.i.f. U.K. port.

BARIUM CARBONATE, 98/100% POWDERED.—Offered from the continent at £9 15s. per ton c.i.f. U.K. port.

BARIUM CHLORIDE, 98/100%.—Spot lots unchanged at about £12 17s. 6d. per ton ex store. Offered for prompt shipment from the continent at £11 10s. per ton c.i.f. U.K. port.

BARYTES.—English material unchanged at £5 5s. per ton ex works. Continental quoted £5 per ton c.i.f. U.K. port.

BLEACHING POWDER.—Spot lots £11 per ton ex station, contracts 20s. per ton less.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. per ton ex station. Continental material on offer at about £5 per ton ex store.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton ex works, packed in casks free.

COPPER SULPHATE.—English material quoted £25 per ton f.o.b. U.K. port for export. Continental on offer at about £24 per ton ex wharf.

FORMALDEHYDE, 40%.—Now quoted £49 10s. per ton ex store, spot delivery, but could probably be obtained for less.

GLAUBER SALTS.—English material unchanged at £4 per ton ex store or station. Fine white crystals on offer from the continent at about £3 per ton c.i.f. U.K. port. Large crystals, 17s. 6d. per ton extra.

LEAD, RED.—Unchanged at about £44 per ton ex store.

LEAD, WHITE.—Quoted £45 10s. per ton ex store spot delivery.

LEAD, ACETATE.—Spot lots available at about £46 5s. per ton ex store. Offered for early delivery at £46 per ton ex station. Brown quoted £40 10s. per ton c.i.f. U.K. port.

MAGNESITE, CALCINED.—Unchanged at about £7 17s. 6d. per ton ex station, prompt delivery. Hard burnt quality quoted £4 15s. per ton ex station. Finer quality of continental manufacture quoted £7 15s. per ton c.i.f. U.K. port.

MAGNESIUM CHLORIDE.—Offered from the continent at £5 2s. 6d. per ton c.i.f. U.K. port.

POTASH CAUSTIC, 88/92%.—Spot material available at about £31 15s. per ton ex store. Offered for prompt shipment from the continent at about £31 per ton c.i.f. U.K. port.

POTASSIUM BICHROMATE.—Unchanged at 5½d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Quoted £22 17s. 6d. per ton c.i.f. U.K. port, prompt shipment. Spot lots unchanged at about £24 15s. per ton ex store.

POTASSIUM CHLORATE.—Unchanged at about 2¾d. per lb. ex wharf, prompt shipment from the continent. Spot lots available at about the same figure.

POTASSIUM NITRATE, SALTPETRE.—Quoted £26 per ton c.i.f. U.K. port, prompt shipment from the continent. Spot lots on offer at £28 15s. per ton ex store.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—Quoted 8d. per lb. ex store, spot delivery. Offered for prompt shipment from the continent at about 7½d. per lb. ex wharf.

POTASSIUM PRUSSIATE, YELLOW.—Slight advance in price. Now quoted 7d. per lb. ex store. Offered for early delivery at about 6¾d. per lb. ex wharf.

SODA CAUSTIC.—76/77%, £19 7s. 6d. per ton; 70/72%, £17 17s. 6d. per ton; 60/62%, broken, £19 2s. 6d. per ton; 98/99%, powdered, £22 15s. per ton. All ex station spot delivery, contracts 20s. per ton less.

SODIUM ACETATE.—Spot lots unchanged at about £23 15s. per ton ex store. Offered for prompt shipment from the continent at about £22 5s. per ton c.i.f. U.K. port.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4¾d. per lb. delivered. Makers advise reduction of ½d. per lb. as from January 1, 1925.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton ex quay or station; powdered or pea quality, £1 7s. 6d. per ton more; alkali 58%, £8 12s. 3d. per ton ex quay or station.

SODIUM HYPOSULPHITE.—English material unchanged at £10 per ton ex station. Continental quoted £8 10s. per ton c.i.f. U.K. port. Spot lots available at about £9 15s. per ton ex store. Pea crystals of English manufacture unchanged at £13 15s. per ton ex station.

SODIUM NITRATE.—Ordinary quality quoted £13 17s. 6d. per ton ex store. 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Unchanged at about £26 per ton ex store.

SODIUM PRUSSIATE, YELLOW.—Unchanged at 4d. per lb. ex store, spot delivery, moderate inquiry. Offered from the continent at about 3¾d. per lb. c.i.f. U.K. port.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption £3 10s. per ton f.o.r. works. Good inquiry for export.

SODIUM SULPHIDE.—60/65 % solid of English manufacture, £4 15s. per ton ex station; broken, £1 per ton more; flake, £2 per ton more; 60/62% solid of continental manufacture quoted £12 5s. per ton c.i.f. U.K. port; broken £1 per ton more. 31/34% crystals of English manufacture, £9 2s. 6d. per ton ex station; 30/32% crystals of continental manufacture quoted £8 10s. per ton c.i.f. U.K. port.

SULPHUR.—Flowers, £9 10s. per ton; Roll, £8 10s. per ton; Rock, £8 7s. 6d. per ton; Ground, £8 5s. per ton ex store, prices nominal.

ZINC CHLORIDE.—96/98% of continental manufacture quoted £23 per ton c.i.f. U.K. port. English material for export on offer at about £25 to £26 per ton f.o.b. U.K. port.

ZINC SULPHATE.—Unchanged at about £12 15s. per ton ex store, spot delivery.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHALENE.—Good inquiry for home and export. Quoted 1s. 3½d. per lb. delivered.

ALPHA NAPHTHOL.—Some inquiry. Quoted 2s. 2d. per lb. delivered.

ANTHRANILIC ACID.—Small inquiry. Offered at 7s. 9d. per lb. 100% basis, delivered.

BETA NAPHTHOL.—Good inquiry. Price quoted 1s. per lb. delivered.

BETA NAPHTHYLAMINE.—Export inquiry. Price quoted 4s. per lb. f.o.b.

CLEVES ACID.—Some home inquiry. Quoted 3s. 3d. per lb., 100% basis, delivered.

CHROMOTROPE ACID.—Some home inquiry. Offered at 6s. 4d. per lb. 100% basis, delivered.

DIPHENYLAMINE.—Good inquiry. Price quoted 2s. 10d. per lb., delivered.

DINITRO TOLUOL.—Small inquiry. Price quoted 11d. per lb., delivered.

LAURENTS ACID.—Small home inquiry. Price quoted 3s. 2d. per lb. 100% basis, delivered.

PARA PHENYLENE DIAMINE.—Export inquiries. Price quoted 10s. per lb. 100% basis.

PHTHALIC ANHYDRIDE.—Fair inquiry Price quoted 2s. per lb., delivered.

The Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, November 20, 1924.

WITH the exception of one or two articles prices on the chemical market here during the past week have kept up fairly well. Arsenic shows no improvement and values continue weak. Pitch, however, which up to a week or two ago was in a very depressed condition, has quite maintained the firmer tone referred to in my last report. An interesting concession is the reduction in the prices of bichromates for contract deliveries over the coming year, makers, as an inducement to buyers to fix up immediately, offering the revised rates in respect of December deliveries under current contracts. The demand for chemicals generally, or at least for the leading lines of heavies, is maintained at the improved level of the past few weeks.

Heavy Chemicals

Saltcake and glauber salts are nominally unchanged at round £3 10s. per ton in each case, but neither is receiving much attention from buyers. Caustic soda is steady at from £16 17s. 6d. per ton for 60 per cent. material to £19 7s. 6d. for 76-77 per cent., and on both home and export account demand is fairly good. Hyposulphite of soda is quiet and rather easier; photographic crystals are offering at £13 15s. to £14 per ton and commercial quality at £9 5s. Bichromate of soda is in moderate request at 4¼d. per lb., with next year's deliveries under contracts now quoted at 4d. Prussiate of soda is receiving rather better attention than of late and prices are unchanged at 4d. per lb. Bleaching powder is still quoted at £10 per ton and slightly more activity has been reported. Alkali continues in quietly steady demand for both branches of trade and values are steady at about £6 15s. per ton. Soda crystals are fairly quiet at £5 5s. per ton. Sulphide of sodium is attracting a little more interest at £14 10s. per ton for 60-65 per cent. concentrated solid and £9 5s. per ton for crystals. Phosphate of soda is inactive at £13 to £13 5s. per ton. Bicarbonate of soda meets with rather a slow sale at £10 10s. per ton. Acetate of soda is steady and in moderate inquiry at £22 15s. to £23 per ton. Chlorate of soda is in fair demand and value is maintained at round 2¼d. per lb.

Caustic potash is well held at £30 to £31 per ton for 90 per cent. material, although the demand is not too brisk. Carbonate of potash, also, is firm at about £23 per ton. Bichromate of potash is in fair inquiry at 5¼d. per lb., the revised price for next year's contracts being 5d. per lb. Yellow prussiate of potash is steady at 6¾d. to 7d. per lb., a fair amount of business being put through. Chlorate of potash meets with a moderate demand at 2¾d. per lb. Permanganate of potash is attracting rather more attention and values are steady at from 6¾d. to 7¼d. per lb., according to quality.

Arsenic is still a very quiet section and prices are weak, about £41 per ton now being quoted for white powdered Cornish makes delivered here. Sulphate of copper is steady and in moderate inquiry at £24 10s. to £25 per ton f.o.b. Commercial Epsom salts are in fair request and unchanged at £4 15s. to £5 per ton, with magnesium sulphate, B.P., still offering at £6 10s. White acetate of lead is well maintained at £46 per ton and brown at £42 10s., a quietly steady demand being met with. Nitrate of lead is still quoted at £42 per ton. Acetate of lime is quiet at £15 for grey and £11 per ton for brown.

Acids and Tar Products

Citric acid is in moderate demand at 1s. 3¼d. to 1s. 4d. per lb. Tartaric acid is quiet and easy at about 11¼d. per lb. Oxalic acid is inactive at 3¾d. to 4d. per lb. Acetic acid is maintained at about £44 per ton for 80 per cent. commercial and £68 for glacial.

Pitch is still meeting with better inquiry and current quotations are steadier at 47s. 6d. to 50s. per ton. Cresylic acid is slightly easier at 2s. 1d. per gallon. Naphthalenes are a little more active than they have been at round £15 10s. per ton for refined and from £5 per ton for crude qualities. Creosote oil is quiet at 5¼d. to 5¾d. per gallon. Solvent naphtha is in fair request at 1s. 4d. to 1s. 4¼d. per gallon. Carbolic is still very dull and weak at 5¼d. per lb. for crystals and round 1s. 9d. per gallon for crude, values, however, being very largely nominal.

American Market Movements

(FROM *Drug and Chemical Markets.*)

No important price changes have taken place, all chemicals apparently holding their own at the recent price levels. Dyes and intermediates continue to show moderate improvement from week to week as textile mills show signs of more extensive operations. The price situation remains unchanged in practically all products. Demand for crudes has apparently lessened. Miscellaneous oils, fats and greases continue in steady demand. The sharp upward swing of prices has halted and a reaction is evident, as some buyers refuse to be interested at present quotations. With stocks of many oils limited no sharp reaction is probable.

Essential oils continue in active demand. Oil lemon is tending scarce. Oil Java citronella is active as short sellers of geraniol cover. Oil caraway is easier. Oil peppermint is firm. Crude drugs show signs of firmness.

The fine chemical demand has fallen off on practically all items. Mercury lower on spot and in London. No change in bromides. Menthol position still acute with Japan refusing to quote. Cod liver oil is firm and active.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

INDIGOS, ARTIFICIAL SILK, OLIVE OIL.—A firm of commission agents in Tunis desires to obtain agencies of British firme exporting indigos, artificial silk; the firm desires also to appoint agents in the U.K. for sale of olive oil. (Referencs No. 546.)

AGENTS' SERVICES.—Commission agents in Rio de Janeiro are desirous of getting into touch with British firms to arrange the representation for the sale of tinplates and iron and steel material, copper, brass, cement, and inks. (Reference No. 554.)

PAPER MAKING REQUISITES.—A British subject in Stockholm desires to secure representation of British manufacturers of sulphur and limestone, pulp-mill felt and peg-drums (manchons), annealed iron wire No. 10, valves, iron and steel, tubes and fittings, "acid proof"; phosphor bronze wire and phosphor bronze cloth, lead sheets and pipes, rubber hose (for steam and water), lubricating oil. The applicant also offers services as buying agent in Sweden for British pulp importers. (Reference No. 539.)

HEAVY CHEMICALS.—A firm in Charlottenburg, Berlin, desires to secure the representation of British manufacturers or exporters of heavy chemicals. (Reference No. 517.)

Australia's Dye Import Restrictions

AN interesting statement concerning restrictions on the importation of dyes was made recently by the Australian Minister of Customs. He said there were no restrictions on the importation of dyes manufactured in Great Britain, nor on any dyes of foreign manufacture imported from Great Britain, provided such dyes were permitted to be imported into Great Britain for use by manufacturers there. Dyes manufactured in and imported from Germany, Switzerland or the United States of America were prohibited, except with the consent of the Minister of Customs. Permits to import these dyes were granted only in instances where it could be shown that effective substitutes of British origin were not available. The restrictions on the importation of American dyes were similar to those on other foreign dyes.

Company News

BRIMSDOWN LEAD CO., LTD.—The share registers and transfer books will be closed from November 22 to December 6, inclusive.

A. B. FLEMING & CO.—An interim dividend of 5 per cent. (actual) for the half-year ended October 31 last has been declared.

AMELIA NITRATE CO., LTD.—The annual general meeting of the company will be held at River Plate House, 10/11, Finsbury Circus, London, on November 27, at 12 noon.

BROKEN HILL PROPRIETARY BLOCK 10.—A report from the liquidators in Melbourne states that a first and final dividend of 5¼d. per share has been declared payable on December 2.

THE EXPLOSIVES AND CHEMICAL PRODUCTS, LTD.—The annual meeting will be held at the offices of the company, Finsbury Pavement House, Moorgate, London, on Friday, November 28.

RIO TINTO CO., LTD.—The Rt. Hon. Sir Auckland C. Geddes, it is announced, has been elected a director of the company in place of the Rt. Hon. Sir Arthur Steel-Maitland, Bart., M.P., who has resigned on being appointed to the Cabinet.

PAN DE AZUCAR NITRATE CO.—The company report a net profit of £20,318 for the year to June 30 last. A final dividend of 15 per cent. is proposed, making 20 per cent. for the year. The sum of £25,000 is placed to reserve, leaving £8,759 to be carried forward.

EASTMAN KODAK CO. OF NEW JERSEY.—The following dividends are announced, payable on January 2:—regular dividend of 1½ per cent. on the preferred stock, regular dividend of $1.25 per share on the common stock, and an extra dividend of $0.75 per share on the common stock.

CASSEL CYANIDE CO.—The directors recommend a final dividend of 9d. per share on account of the year ended September 30, 1924, making with the interim dividend paid in June last 1s. per share for the year. It is proposed that this dividend be paid on December 11 to all shareholders on the register at November 13. For the previous year the dividends aggregated 9d. per share.

ANGLO-PERSIAN OIL CO., LTD.—The profit for the twelve months ended March 31, 1924, amounted to £2,507,866, which with the balance brought forward, less corporation profits tax for 1923, makes a total of £4,181,643. The directors now recommend the payment on December 31 next of a dividend on the ordinary shares of 10 per cent. per annum, less tax, absorbing £895,000, leaving a balance of £1,746,643 to be carried forward, subject to excess profits duty, if any, for the year ended March 31, 1921, and corporation profits tax for the year ended March 31, 1924.

LANGDALE'S CHEMICAL MANURE CO.—Presiding at the annual meeting in Newcastle on November 15, Mr. E. L. Beckingham said that although they were only paying a 2½ per cent. dividend it was a satisfactory improvement. The whole of the adverse balance of 1921 had been wiped out, and during the past year they had made a substantial profit. Foreign producers had again depressed values of super-phosphate, and they had consequently had to reduce output, but they had had a satisfactory increase in the sales of raw and ground phosphate potash and special mixed manures.

MINERALS SEPARATION, LTD.—The report for the year to December 31 last states that the accounts show a credit balance amounting to £3,217. Certain difficulties which had arisen in connection with the company's new patented briquetting process at Nantes have now been overcome, and the plant is stated to be running so satisfactorily that the directors are able to confirm the opinion expressed in their last report that a wide field for the use of this system is assured. Much further work has been done by associated companies in opening up the copper deposits which are now known to exist in Northern Rhodesia. The annual meeting will be held at Winchester House, London, on November 27.

AMALGAMATED ZINC (DE BAVAY'S).—The directors' report for the half-year to June 30 last states that the liquid assets show a surplus over liabilities of £228,457, not including £413,730 for shares in other companies at cost and valuation. After transferring £3,030 to reserve for depreciation, the gross profit on working account was £12,462. Including £22,144, dividends received, and £4,650, representing interest earned, discounts, etc., and after including profit and loss items, net profit was £32,196, which, added to £23,500 transferred from equalisation reserve and including £10,814 brought forward, made available £66,510, from which £41,439, utilised for depreciation of property, patents, processes and shares account, has been deducted, leaving credit balance of £25,071 carried forward. The half-yearly meeting will be held in Melbourne on November 20.

LAGUNAS SYNDICATE, LTD.—At the annual meeting held in London on Tuesday, Mr. W. J. Welch, the chairman, said that manufacturing operations at South Lagunas had progressed satisfactorily throughout the year. The production of potash nitrate had been maintained, and may in the future be increased as the demand for that commodity appeared to be growing. The most important of recent happenings during the twelve months under review was the renewal of the nitrate and iodine combinations for periods of six years. Certain emendations, he was pleased to say, had been made in the statutes of both associations based on the experience gained during previous administrations. Referring to the actual consumption of nitrate for the year ended June 30 last, he said the figures showed only a slight increase compared with the preceding year. It must not be forgotten, of course, that Germany was not buying nitrate. Before the war that country consumed from 12-14,000,000 quintals of nitrate, which was a large quantity and needed a great deal of making up. On the other hand, the demand in the United States was steadily improving, and might easily within quite a short time assume proportions not hitherto contemplated.

New Chemical Trade Marks

Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs. Opposition to the Registration of the following Trade Marks can be lodged up to December 19, 1924.

"CELCURE."

452,177. For wood preservatives. Gilbert Gunn, 21, Park Road, Pollokshaws, Glasgow, chemical engineer. September 26, 1924.

"DODOL."

452,361. For raw, or partly prepared vegetable, animal and mineral substances used in manufactures, not included in other classes. Class 4. Burrell and Co., Ltd., Burrell Wharf, Millwall, London, E.14; and 40, Trinity Square, London, E.C.3; colour and varnish makers, oil boilers and refiners. October 2, 1924. (To be Associated. Sect. 24.)

Oil Company's Voluntary Liquidation

A MEETING of the creditors of the British Oil Importing and Refining Co., Ltd., of Winchester House, Old Broad Street, London, in voluntary liquidation, was held on November 17 at 1A, Capel House, New Broad Street, London, when Mr. Morgan, the liquidator, presented a statement of affairs which disclosed liabilities of £10,345 17s. 2d., and assets, after deducting preferential claims, of £3,263 3s., or a deficiency of £7,082 14s. 2d.

The company was formed on June 11, 1922, with a nominal capital of £10,000, and was successful for the first year. This year, however, the company made large advances on dock warrants, etc., and had been forced to realise at a loss. It was found impossible to carry on, and voluntary liquidation had taken place. There was a petition on the file for the compulsory liquidation of the company, but the petitioning creditor was willing to fall in with the voluntary liquidation provided the costs of the petition were met in full. This was agreed to and a resolution was passed confirming the voluntary liquidation of the company with Mr. Morgan as liquidator, with a committee of inspection.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

GREGORY (WILLIAM), LTD., 50, Grooms Hill, Greenwich, analytical chemists. (C.C., 22/11/24.) £31 16s. July 1.

STANSFIELD, J. L., Boothfold, Waterfoot, Manchester, chemical manufacturer. (C.C., 22/11/24.) £36 9s. 2d. June 30.

Receivership

DIAMOND SODA CO., LTD. (R., 22/11/24.) W. R. Graves, of 17, Coleman Street, E.C.2, ceased to act as Receiver or Manager on November 5, 1924.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

BOUTALLS, LTD., London, W.C., chemists. (M., 22/11/24. Reg. October 27, mort. & land registry charge to bank, charged on 20, Bury Street, W.C. (with machinery, &c.), and 46, Marchmont Street, W.C., respectively. *Nil. January 9, 1924.

BRYTEENA SILK DYEING CO., LTD., London, W. (M., 22/11/24). Reg. November 8, £500 debenture to H. Mills, 34, Red Lion Square, W.C., secretary of a company; general charge.

HOLDERS (LONDON), LTD., London, N.W., chemical merchants, etc. (M., 22/11/24.) Reg. November 10, £200 debentures, part of £1,000; general charge. *£75. May 21, 1924.

OREANU (JOSEPH), LTD. (late J. OREANU, LTD.), London, E.C., drug manufacturers. (M., 22/11/24.) Reg. November 6, £3,000 debenture, to Hales, Hancock and Godwin, Ltd., Gamage Buildings, Holborn, E.C.; general charge.

REXEAN CO., LTD., Southport, perfume manufacturers. (M., 22/11/24.) Reg. November 6, £1,000 debentures; general charge. *Nil. May 16, 1923.

Satisfactions

WALKERS PAINTS, LTD., London, S.W. (M.S., 22/11/24.) Satisfaction reg. November 8, £400 reg. November 16, 1922.

YOUNG (JOHN) (OF RADCLIFFE), LTD., bleachers, etc. (M.S., 22/11/24.) Satisfaction reg. November 5, £2,000, part of amount outstanding July 1, 1908.

London Gazette, &c.

Company Winding Up Voluntarily

EZI-DA SUNDRIES, LTD. (C.W.U.V., 15/11/24.) T. Greenwood, of the firm of Cooper and Cooper, 12, Bowkers Row, Bolton, Chartered Accountant, appointed liquidator, October 31.

New Companies Registered

ASSOCIATED DRUGS & CHEMICALS, LTD., 18, Sackville Street, London. Manufacturing and general chemists and druggists, etc. Nominal capital, £100 in £1 shares.

BRITISH COPPER MANUFACTURERS, LTD., 4, London Wall Buildings, London, E.C. Smelters, refiners, manufacturers of and dealers in copper, yellow metal, cobalt, zinc and spelter, etc. Nominal capital, £1,500,000 in £1 shares (500,000 6 per cent. cumulative preference and 1,000,000 ordinary).

STRONTIUM PRODUCTS, LTD. Manufacturers of chemicals and manures, distillers, dye makers, gas makers, metallurgists, etc. Nominal capital, £3,000 in £1 shares (1,500 8 per cent. cumulative preference). Solicitor: E. Thomas, Temple Chambers, 8, St. John's Square, Cardiff.

Tariff Changes

GERMANY.—The following goods may now be exported from Germany without an export licence:—

Spirit and methylated spirit; other distilled spirituous liquors and mixtures of alcohol with ether and solutions of ether in alcohol in receptacles of a capacity of 15 litres or more. Clays and all kinds of loams, whether calcined, ground, washed or not; Chamotte and Dinas clays (mortar). Chalk, white, raw. Emery, raw, ground or washed. Magnesite and witherite, even if calcined, strontianite. Talc (Spanish or Venetian chalk), raw, also ground or calcined. Feldspar common, even ground or calcined. Artificial alumina; refined bauxite. Chalk, white washed; also raw chalk in dust or finely pulverised in any other manner. Fireproof bricks of all kinds (Chamotte, Dinas, and other siliceous bricks, bauxite, magnesia and carboniferous bricks for fireproof stove lining), glazed or not. Fireproof products of clay or clayey substances, glazed or not (crucibles, retorts etc.).

HUNGARY.—Dyed artificial silk may now be imported without import licence.

L.C.C. Sludge Vessel Launched at Barrow

THE *G. W. Humphreys*, the second of the two sludge vessels ordered by the London County Council from Vickers, Ltd., in March last, was launched from the Naval Construction Works at Barrow-in-Furness on Thursday, November 13. The dimensions are:—Length b.p., 260 ft.; breadth moulded, 43 ft. 6 in.; depth moulded, 16 ft. 10 in. The vessel is of the flush-deck type with a continuous main deck. A loading hopper 12 ft. long by 4 ft. wide by 4 ft. 6 in. high is fitted over the sludge tanks, complete with valves, etc., for diverting sludge. The vessel is so designed that the sludge will run out by gravity through shoots fitted between the lower deck and the bottom of the vessel—two shoots being fitted to each compartment. These shoots are fitted with valves 20 in. diameter, controlled from the main deck. The total capacity of the sludge tanks is 1,500 tons, and with all valves opened a full cargo can be discharged in the open sea inside ten minutes. The accommodation includes a chemical laboratory, which is fitted at the fore end of the deckhouse, two spare cabins also being provided for the accommodation of chemists.

The Late Sir William Crookes's Books

ON Friday, November 14, a collection of chemical journals and scientific books from the library of the late Sir William Crookes was sold by auction by Hodgson and Co., of 115, Chancery Lane, London. The following are the names of the purchasers and the prices paid for some of the principal items:—

Journal of the Franklin Institute, vols. 5 to 198.—Quaritch, £50.

American Journal of Science, vols. 77 to 202.—Wheldon and Wesley, £23.

Royal Society, Philosophical Transactions, vols. 153 to 217, including Series A and B.—Deighton, Bell and Co., £55.

Royal Society, Catalogue of scientific papers, 1800–1900.—A. Hermann, £11 15s.

Academie des Sciences, vols. 58 to 179.—Deighton, Bell and Co., £40.

Revue Générale des Sciences pures et Appliquées, vols. 1 to 35.—Heffer and Sons, £10.

Chemical Society Journal, from commencement in 1841 to 1924, vols. 1 to 4 and 8 to 125.—Quaritch, £140.

The Analyst, from the commencement in 1877 to 1924, vols. 1 to 49.—Lewis, £55.

Journal of the Society of Chemical Industry, from the commencement in 1882 to 1924, vols. 1 to 43.—J. Thin, £50.

Science Abstracts, vols. 1 to 25.—Lewis, £14 10s.

The sale realised £578.